RFQ # 20-13

REQUEST FOR QUALIFICATIONSFOR DESIGN SERVICES

Anaerobic Digesters at Greenfield Wastewater Treatment Plant

Phil Wartel
Chief Procurement Officer
Greenfield City Hall
14 Court Square
Greenfield, MA 01301
Phone: 413-772-1569

PROPOSALS DUE: APRIL 2, 2020 at 2:00 PM

(Legal Advertisement)

The City of Greenfield is soliciting qualifications for professional Designer Services relating to the design and construction of a anaerobic digester and support structures located at the Greenfield Wastewater Treatment plant in Greenfield, MA per M.G.L. c7§ 38A1/2-O.

The initial contract will be for design services through and including solicitation of public bids. Subject to receipt of construction bids, the City **may** elect to extend the design services through construction and closeout.

Applicants should demonstrate a record of successful experience with projects of this magnitude, and more importantly with the design of similar facilities in Massachusetts in the recent past.

A Pre-Submittal Site Visit is planned for Monday, March 16, 2020 at 1:00 PM at the Greenfield Wastewater Treatment Plant, located at 384 Deerfield Street, Greenfield, MA 01330. Participation by prospective designers is encouraged.

As of 10:00 a.m. on March 11, 2020 copies of this RFQ 20-13 for Anaerobic Digester Designer may be obtained from the City of Greenfield website at www.Greenfield-ma.gov under "Departments", "Purchasing", "Active Bids/RFQ/RFP" (https://greenfield-ma.gov/p/1815/Current-FY-2020) or electronically by contacting the Purchasing Department of the City of Greenfield at purchasing@greenfield-ma.gov or by calling Phil Wartel at 413-772-1569.

Sealed proposals must be endorsed "RFQ 20-13 Anaerobic Digester Designer" and will be accepted at the address below until the proposal deadline of April 2, 2020 at 2:00 PM Eastern time. Late proposals will be rejected. Proposals will be opened and recorded.

The City of Greenfield reserves the right to reject any or all bids wholly or in part; to waive technicalities and informalities; to amend and/or cancel bid prior to the time of opening; to make awards in a manner deemed to be in the best interest of the City; to correct any award erroneously made as a result of a clerical error on the part of the City.

Phil Wartel, CPO
Purchasing Department
2nd Floor City Hall
14 Court Square
Greenfield, MA 01301

I. GENERAL INFORMATION

The City of Greenfield, Massachusetts ("Owner", or "City"), is soliciting proposals from design firms for the construction of a new anaerobic digester and associated support facilities and structures at the Greenfield Wastewater Treatment Plant, located at 384 Deerfield Street, Greenfield, MA 01330, with an estimated construction cost of $6.2 Million ("The Project").

The new facilities that would comprise the Project include:

- Underground tank for receipt, screening, mixing and storage of feedstocks
- Mixing tank to receive, store, condition and mix sludge, septic waste, other source-separated organics materials and any other inoculants or chemicals,
- One (1) anaerobic digester to process a volume of 5,500 gallons of sludge per day.
- Digestate storage tank,
- Dewatering system,
- Renewable energy power and thermal production system (the engine-generator set and auxiliary equipment) and emergency generator

This request for design services is made per M.G.L. c7§ 38A1/2-O. The firm or individual selected for this project will have a demonstrable ability to engage in this type project and provide the City with the guidance required to make informed choices in developing and carrying out this project.

II. INSTRUCTIONS TO APPLICANTS

The City of Greenfield will accept proposals for design services relating to design of the Anaerobic Digesters as described above and herein. All proposals shall be delivered by 2:00 PM, April 2, 2020, to the following address:

Phil Wartel, CPO
Purchasing Department
2nd Floor City Hall
14 Court Square
Greenfield, MA 01301

A total of one marked as the Original and eight (8) copies of all proposals along with all required forms shall be submitted and shall be presented upon the letterhead of the firm or individual. Additionally, one electronic copy on flash-drive must be submitted. Envelopes must be sealed with the name of the bidder, the RFQ number and opening date clearly evident. All materials presented shall become the property of the City.

Questions regarding this Request must be in writing and must reference the RFQ number and issued date. Written addenda may be issued by the City to clarify or change specifications of the request. No verbal clarification will be valid. It is the responsibility of the Design Firms to make sure that all your contact information is on the bidders list in the Purchasing Department. All addenda are made available through the City's Website:
https://greenfield-ma.gov/p/1815/Current-FY-2020

A Pre-Submittal Site Visit is planned for Monday, March 16, 2020 at 1:00 PM at the Greenfield Wastewater Treatment Plant, located at 384 Deerfield Street, Greenfield, MA 01330. Attendance is encouraged.

Qualifications will be evaluated by a Review Committee. Qualifications will be evaluated by the evaluation criteria. Proposals ranked the highest based on criteria will be placed on a short list of recommended proposers. From this short list the Review Committee may select proposers to participate in an interview with the Review Committee. Finalists will then be ranked and evaluated, and the reasons for the ranking will be documented. The Committee will then enter into negotiations with the top ranked finalist for the contract price. If negotiations stall or do not move forward the Committee will enter into negotiations with the next highest ranked finalist. The successful respondent will report to, and work with the Owners Project Manager, and any representative the City designates as Project Director.

The costs associated with the preparation and submission of documents is considered a part of the cost of doing business and as such will not be reimbursed, regardless of circumstances.

Owner Description

The Owner will be the City of Greenfield. Any contract or agreement with the selected Designer will be with the City of Greenfield through the Purchasing Department. The principal contact with the City of Greenfield will be Marlo Warner, Director, of the City of Greenfield Department of Public Works.

Applicants or potential applicants shall direct any questions and inquiries concerning this request, including questions concerning the proper form and scope of proposals responsive to this request, in writing, only to Phil Wartel, Chief Procurement Official, who is the sole person designated by the City to respond to such inquiries.

Owner's Project Manager Role

Construction Monitoring Services ("CMS") is a Marlborough, MA based Owner's Project Management firm that specializes in coordinating design and construction projects. CMS is the Owner's Project Manager (OPM) working directly for the City of Greenfield. CMS will be acting as The City of Greenfield's representative throughout the process and, along with internal City of Greenfield personnel, will be involved with the selection and management of the Designer and Contractor involved with the project.

Quality and Standards

The Designer shall complete the services required in a prompt and continuous manner. Designer services shall be performed in conformance with applicable federal, state, and local laws, ordinances, and regulations.

Construction Budget

The designer shall design in accordance with the set construction budget. Conformation will be confirmed through periodic estimates prepared by the designer (Schematic design, design development and 90% construction documents). Additional cost estimates may be performed by the owner or its designee during the design. Adjustments to project scope for redesign efforts to meet the construction budget will be at the cost of the designer.

In the event the cost as estimated by the designer exceeds the construction budget, the OPM and Designer shall consult and recommend to the Owner appropriate revisions to the scope of work or the construction budget.

Design Schedule

The designer schedule will be as follows:

- Program and Schematic Design Review: April 2020
- Project Design Development and Site Investigations: May 2020 / June 2020
- Construction Documents: July 2020 through October 2020
- Bidding – November 2020 - December 2020
- Construction* – January 2021 – October 2021*
- Closeout* - November 2021*

Additional time will not be allowed for redesign to correct the design to match the budget.

*if awarded. Construction and closeout phases are not guaranteed and are subject to receipt of satisfactory bids and confirmation of funding.

Ownership of Documents

All documents, including but not necessarily limited to, studies, designs, drawings, specifications, materials, and submissions prepared for the Project shall be the property of the Owner, and at the completion or termination of the designer services, original documents and electronic files shall be promptly turned over to the Owner. The Owner shall have all right, title and interest in such submissions, including any rights under copyright law, whether express or implied.

Comprehensive Professional & General Liability Insurance

The designer shall carry Professional Liability Insurance with an insurance company satisfactory to the City of Greenfield so as to save the City harmless from any and all claims for damages arising out of bodily injury or destruction of property caused by accident resulting from the use of implements, equipment, or labor used in the performance of the contract or from any neglect, default, or omission or want of proper care, or misconduct on the part of the designer or for anyone in his employ during the execution of the work. Minimum coverage shall be as follows:

Professional Liability Insurance with minimum limits of $1,000,000 per claim.
General Liability - $1,000,000/occurrence with $3,000,000/aggregate
Umbrella/Excess Liability 1,000,000.
Workers Compensation – Statutory. Employer's Liability - $100,000/$500,000/$100,000.

The designer shall not cancel, change, or revise any insurance relating to this contract without at least thirty (30) days prior notice. Prior to the effective date of any such cancellation, the designer shall take out new insurance to cover the policies so canceled and shall provide certificates stating that such insurance is in effect.

The designer agrees to save, defend indemnify and hold harmless the City of Greenfield against any and all suits, claims or liabilities of any name, nature or description arising out of or in consequence of the acts of its agents, servants or employees, in the performance of the obligations under this contract or by reason of its failure to fully comply with the terms of this contract, such indemnity to run to the City officers, Agents and employees of the City of Greenfield.

Feasibility Study & Conceptual Design

The City, under separate agreement, completed a feasibility study / concept design with Commonwealth Resource Management Corporation, a copy of which can be found in Appendix 1 of this RFQ.

Breach of Contract

In the case of failure on the part of the designer to execute the work as per agreement, the City of Greenfield reserves the right to terminate the contract, satisfying its wants through another design firm, and the City of Greenfield may collect from the original designer any difference in price as a result of such failure on the part of the original designer. “Failure” shall be interpreted as meaning willful non-compliance of any item included in the specifications.

This contract may not be terminated for any other reason than that set forth in the above paragraph, unless by mutual consent of both parties to the contract, and then only if a minimum of thirty (30) days notice of intent to seek to terminate the contract is given in writing to all parties to the contract.

Exercise of the rights herein specified shall not impair or affect the City’s right to recover the damages for breach of contract.

Contractual Liability

Failure to perform when such failure is due to an act of God, public enemy, fire, strikes, labor difficulties, transportation embargoes, or other similar causes beyond the control of the designer, shall be good and sufficient reason for excuse from contractual liability.

Good Faith, Fraud, and Collusion

The proposer hereby certifies that no officer, agent or employee of the City of Greenfield has a special interest in the RFQ; that the proposer is competing solely on their own behalf without connection with, or obligation to, any undisclosed person or firm; that this proposal is made in good faith without fraud, collusion or connection of any kind with any other bidder for the same work **(**See Non-Collusion form). Form must be executed and returned with proposal.

Acknowledgement of ADA and Section 504

The City acknowledges the existence of the Americans with Disabilities Act (ADA) of 1990, & Section 504 of the Rehabilitation Act of 1973. The rights guaranteed within these Acts shall apply to this contract.

Interpretation of RFP Documents

All interpretations and supplemental instructions will be in the form of written addenda to the specifications, which, if issued, will be mailed, faxed or emailed to all proposers on record as having requested the RFQ. Failure of any proposer to receive any such addendum or interpretation shall not relieve any proposer from any obligation under this submission. All addenda as issued shall become part of the contract documents. Any addenda would be available from the City of Greenfield, either by website or in person, as noted in this RFQ.

Modification of Qualifications

A proposer may correct or modify qualifications by written notice received by the awarding authority prior to the receipt deadline. Modifications must be submitted in a sealed envelope clearly labeled". The name and address should also be documented on the envelope.

After the receipt deadline, a proposer may not change any provision of the proposal. Minor informalities will be waived or the proposer will be allowed to correct them. If there is a mistake and the intent is clearly evident on the face of the document the mistake will be corrected to reflect the intended correct proposal, and the proposer will be notified in writing; the proposer may not withdraw the proposal. A proposer may withdraw a proposal if a mistake is clearly evident on the face of the document, but the intended correct proposal is not similarly evident.

Withdrawal of Qualifications

Qualifications may be withdrawn prior to the time of receipt of qualifications, only on written request to the awarding authority. No proposer shall withdraw his qualifications within a period of ninety (90) days after the date set for the receipt of qualifications.

Unexpected Closures

If at the time of the scheduled receipt deadline, the City of Greenfield is closed due to uncontrolled events such as fire, snow, ice, wind, building evacuation, etc. the receipt of proposals will be postponed to the next normal business day at the time posted in the Request for Qualifications. Qualifications will be accepted until that date and time.

III. GENERAL AND SPECIAL PROVISIONS

1. The City reserves the right to cancel this Request for Qualifications, or to accept or reject any and all qualifications, waive informalities, & to award contracts in the best public interest of the City.

2. All qualifications received become the property of the City of Greenfield.

3. The firm selected shall be expected to comply with all applicable federal and state laws in the performance of services.

4. The consideration of all qualifications and subsequent selection of an architectural firm shall be made without regard to race, color, sex, age, handicap, religion, political affiliation, or national origin.

5. The successful firm shall adhere to the provisions of the Fair Employment Practices Law of the Commonwealth of Massachusetts (See Gen. Laws c. 151B).

6. The provisions relating to non-discrimination and affirmative action in employment shall flow through all contracts and sub-contracts that the successful firm may award as a result of this contract.

7. Firms and/or individuals preparing qualifications may be asked to provide additional information and/or may be requested to make a presentation of their proposal.

8. Qualifications must be unconditional.

9. Selection shall be subject to additional discussions and/or negotiations based on qualifications received.

10. The City of Greenfield is an equal opportunity employer. Women and minority owned businesses are encouraged to apply.

11. Applicant must fill out DSB form and submit with RFQ package, see attached.

12. **Each Prospective consultant's qualifications shall include a letter of transmittal not to exceed one (1) page, signed by an individual(s) authorized to bind the prospective Consultant contractually. This letter must state that the Qualifications will remain valid for 45 days from the date of submission of the Qualifications and thereafter until the prospective consultant withdraws it, a contract is executed: or the procurement is terminated by the City, whichever occurs first.**

    The transmittal letter shall include the name, title, address and telephone number of one or more individuals who can respond to request for additional information and also, of one or more individuals who are authorized to negotiate and execute a contract on the prospective consultant's behalf, if applicable.

Selection Date

It is expected that interviews will take place as soon as possible, when the building committee can convene.

Bid Rejection

The City of Greenfield may reject any bids in accordance with M.G.L. c. 7.

Questions

Questions should be directed to no later than 7 (seven) days prior to the qualification due date. All questions should be sent in writing or via email to:

Phil Wartel
Chief Procurement Officer
City Hall, 14 Court Square
Greenfield, MA 01301
Phone: 413-772-1569
phil.wartel@greenfield-ma.gov

All questions of substance will be answered via email to all known prospective applicants and as an addendum posted to the Procurement website. NO TELEPHONE CALLS PLEASE.

Governing Law

The contract shall be governed by the laws of the Commonwealth of Massachusetts.

Faxes

Faxes of RFQ responses WILL NOT be accepted.

IV. SUBMISSION REQUIREMENTS

Each RFQ must include (at least one original) of the following:

1. DSB form
2. Collusion or Fraud Statement
3. Tax Certification Affidavit
4. Executed designer/OPM cooperation form

Fee Proposal

If the City elects to do so, the City, through the Mayor, may negotiate a fee for the extension for professional services rendered hereunder for construction and closeout. Fee proposals are not to be submitted with the RFQ. The City intends to enter into negotiation with the top ranked firm.

V. SCOPE OF WORK

Basic Services include, but are not limited to cost estimating, architecture, civil, sanitary, mechanical, electrical, plumbing, fire protection, structural, site planning and landscape architecture, environmental permitting, graphics, lighting design, acoustics, data and communications, and specialty consultants (including but not limited to commissioning, accessibility, energy evaluations and other peripheral matters), preparation of construction documents, bidding and administering the construction, contract documents and other design and consulting services incidental and required to fulfill the project goals. The Designer's efforts shall include the following:

Programming

a) Familiarize yourself with the conditions and programming of the existing facility.
b) Review information already obtained by the OPM and The Owner with regards to expectations of the new facility.
c) Participate in the site selection finalization.
d) Meet and review program requirements provided by The Owner, including existing and projected personnel, furniture, furnishings and equipment. Establish specific project parameters and objectives.
e) Review responsibilities, schedules and procedures.
f) Interview designated personnel/departments to determine special operational and functional requirements and organize and/or attend focus groups as required.
g) Prepare summary of interviews for review by The Owner.
h) Review equipment usage and power, ventilation, storage and other requirements.
i) Prepare a program summary report including statement of requirements, project schedule, and blocking/stacking diagrams.
j) Review program summary with The Owner and incorporate revisions and concerns.
k) Prepare a final program summary report. All information to be stored in a database with a spreadsheet executive summary clearly defining all The Owner's needs.
l) Address shell/core maintenance issues.

m) The scope of work will include periodic design review meetings occurring on a frequency necessitated by the project, inclusive of community meetings and presentations.

Schematic Design

a) Based on program summary report, develop and present space plans, including space allocations and adjacencies.
b) Prepare preliminary design concepts and finish selections.
c) Outline MEP&FP systems with respect to program requirements.
d) Review space plans and pertinent code and regulations with local officials.
e) Assist in the generation of the project budget, including a Schematic Level Project Estimate.
f) Secure approval for design from The Owner.
g) Review preliminary plans with the local Fire, Building Departments and local private and public utilities.
h) Review schematic designs with the Owner for approval. The scope of work will include periodic design review meetings, inclusive of community meetings and presentations.

Design Development

a) Prepare and present final design development plans and details, fixing dimensions and provide details for the architectural, electrical and lighting solutions.
b) Develop color schemes that include all materials, finishes, colors, plans illustrations of the finished space. Provide finish boards.
c) Provide printed plans and design information for preliminary pricing and review.
d) Participate in value analysis as necessary to align scope to the budget.
e) Revise Design Development documents as required to incorporate The Owner's needs and budget considerations.
f) Review Design Development plans with the local Fire and Building Departments.
i) Review progress drawings with the Owner for approval. The scope of work will include periodic review meetings, inclusive of community meetings and presentations.

Construction Documents

a) Based on the approved schematic design and comments from local fire and building officials, prepare all necessary demolition, architectural, structural, plumbing, electrical, mechanical, fire protection and site drawings necessary to obtain proper permitting and construction estimates.
b) Coordinate all documents and specifications of all disciplines.
c) Issue construction documents for Owner review.
d) Prepare and issue Construction Documents for general contractor bidding per MA GL Chapter 149.
e) Lead pre-bid conference, respond to questions.
f) Modify construction documents via addenda if necessary to reflect answers or changes resulting from questions from bidders.
g) Review bid package for responsiveness and completeness
h) Evaluate bids and make recommendation to The Owner. This may include reviewing bid packages and assisting in confirmation that the bid packages are complete.

j) Review progress drawings with The Owner for approval. The scope of work will include periodic review meetings, inclusive of community meetings and presentations.

Should the City elect to move forward with the Designer:

Construction Phase

a) Attend weekly construction meetings with the Owner, contractor, OPM and related parties, make weekly site visits and provide weekly progress reports on all work completed.
b) Make revisions and changes to drawings as necessary.
c) Review shop drawings.
d) Review and prepare change orders.
e) Provide affidavits as required.
f) Assist in generating punch-list.

Documentation

a) Upon project completion, provide The City of Greenfield and OPM with one complete set of as-bid documentation in AutoCAD version 2004 or higher for the contractor's use in developing complete as-built records.

VI. EVALUATION CRITERIA

Comparative Evaluation Criteria

The City of Greenfield will evaluate responses base on attributes that shall include, but not be limited to:

a) Demonstrated experience in designing & overseeing completion of anaerobic digesters;

Highly Advantageous: The applicant has at three (3) or more successful projects of similar size and scope to this project.
Advantageous: The applicant has two or three (2-3) or successful projects of similar size and scope to this project.
Unacceptable: The applicant has at no experience designing projects of similar size and scope to this project.

b) Demonstrated history of working on public projects of similar size;

Highly Advantageous: The applicant has at least five (5) years experience consulting with projects of similar size and scope to this project.
Advantageous: The applicant has at least three (3) years experience consulting with projects of similar size and scope to this project.
Unacceptable: The applicant has at no experience consulting with projects of similar size and scope to this project.

c) Consulting Team;

Highly Advantageous: The Designer includes consultants or in-house engineering disciplines and consultants that have successfully worked together in the area of Western MA.
Advantageous: The Designer includes some consultants or in-house engineering disciplines and consultants that have successfully worked together in the area of Western MA.

Unacceptable: The Designer has no experience with its engineering disciplines and consultants in the area of Western MA.

d) Experience with prior clients, including reference comments to the following (rated 1-10):

I. Worked as a team member
II. Responded to Owner desires
III. Met the schedule of design deliverables
IV. Successfully designed to budget
V. Completeness of Bid & construction documents
VI. Would hire the firm again;

Highly Advantageous: More than 5 repeat clients and/or all positive references
Advantageous: Less than 3 repeat clients and/or majority positive comments
Unacceptable: No repeat clients and/or less than a majority of positive comments.

e) Experience in working with Owner focus/user groups during the entire design process;

Highly Advantageous: Demonstrates expertise with numerous projects.
Advantageous: Demonstrates some experience and understanding.
Not Advantageous: Demonstrates no experience or understanding.

These attributes will be rated from information received in the proposal, reference checks and from any interviews held. The City reserves the right to seek project references outside of those provided by the respondents, if necessary. Any response that fails to specifically address each above-listed attributes, in order, will be rejected.

VII. SUBMISSION CRITERIA

Overview

a) Indicate how you intend to coordinate this project including anticipated meetings, site visits, and Project Team names including resumes or documentation from any consultants or engineers.
b) List any like projects recently completed of similar type and/or scope to include square footage and construction cost information and schematics.
c) Include a completed Massachusetts designer selection form.
d) Include total construction costs and change order values per project.
e) List your references.
f) List the Subcontractors / subconsultants you plan to use.
g) List your firm's current workload and how it may impact your ability to handle this project.
h) List any other value added services.
i) List any litigation your firm or any of its principals may have been involved within the past five years and specify the status and/or any results.
j) Include the annual amount of architectural work your firm has performed over the past five years. Provide audited financial statements.
k) Provide firm history working on "green" and/or LEED certified projects.
l) The proposal shall not exceed 42(forty-two) pages (21 double sided), including the cover letter. This count includes all forms except for the DSB form.

Cost Proposal

Do not include fees in the initial proposal. The designer's fee shall not exceed the approved budget for the Design Phase.

EXHIBIT A

The City of Greenfield (the Owner) has appointed Construction Monitoring Services, Inc. (CMS) to observe the work and to have such other responsibilities as the Owner and CMS agree in writing. Designer confirms that they will:

a) Cooperate with CMS in every way.

b) Provide full access to all parts of the Project and the Work to CMS during normal working hours.

c) Provide advance notice and invite CMS to all project meetings and subcontractor / subconsultant meetings concerning the project.

Designer will indemnify, defend and save CMS harmless from any claims, losses, costs or expenses, including attorney's fees and court costs, arising from any occurrence or matter including, but not limited to, the exercise of any agency on behalf of THE OWNER, undertakings and approvals authorized on behalf of Owner, personal injury, death and property damage, related to the conduct of the work including third party claims.

Until the Contractor has been given written notice to the contrary, CMS shall act as the Owner's representative in connection with the project. CMS shall attend regularly scheduled project meetings as well as all special project meetings of which it has been given adequate notice. Any action by the CMS shall be binding upon the Owner. The Owner may, by written notice pursuant to the provisions of this Agreement, designate another representative to act on its behalf.

Accepted by:

_____ _____

Name Date

_____

Company

CERTIFICATE OF NON-COLLUSION: REQUIRED FORM

Pursuant to M.G.L. Ch. 30b, s10, the undersigned hereby certifies, under penalties of perjury, that this bid or proposal has been made and submitted in good faith and without fraud or collusion with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

Certificate of Non-Collusion

The undersigned certifies under the penalties of perjury that this bid or bid has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business partnership, corporation, union, committee, club or other organization, entity or group of individuals.

_____ _____

Signature of person submitting contract/bid Date

_____

Name of Business

CERTIFICATE OF TAX COMPLIANCE

Pursuant to M.G.L. Ch.62c, s49A, I hereby certify, under penalties of perjury that to my best knowledge and belief that the undersigned bidder has filed all state tax returns and paid all state taxes required by law.

Certificate of Tax Compliance

Pursuant to M.G.L. c. 62C, §49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

_____ _____

Social Security Number or Federal Identification Number

Signature of Individual or Corporate Name

_____

Corporate Officer (if applicable)

FORM FOR RFQ

Having fully examined, read, and in understanding of the specifications for this job and being familiar with all of the conditions surrounding the proposed work and or supplies, including any addenda for which receipt of is acknowledged below, the undersigned proposes to complete all work as specified in this invitation to bid for the price stated below:

Company Information:

Name _____

Address _____

_____

Telephone _____

Fax _____

E-Mail _____

FID # _____

Acknowledgement of Addenda #'s: _____

Signature for Individual

Name of Company _____ Telephone Number _____

Name and Title of Individual Authorized to Sign _____ Fax Number _____

Signature _____ Date _____

Email _____

Signature for Partnerships (must be signed by ALL general partners)

Name of Partnership _____ Date _____

Name and Title of Partner _____ Signature _____

Name and Title of Partner _____ Signature _____

Name and Title of Partner _____ Signature _____

Telephone Number of Company Offices _____ Fax Number of Company Offices _____

Email _____

Use additional sheet it necessary

Signatures for Corporation

Name of Corporation Date

Printed Name and Title of Duly Authorized Company Officer
Corporate Seal (affix below)

Signature

Telephone Number Fax Number

E-Mail Address FID Number

Signature of Clerk

Please furnish the following additional information:
Incorporated in what state?_____President: _____
Treasurer:_____Secretary: _____
If you are a foreign (out of state) corporation, are you registered with the Secretary of the Commonwealth in accordance with the provisions of M.G.L. Chapter 156D § 15.03? _____

Commonwealth of Massachusetts

Standard Designer Application Form for Municipalities and Public Agencies not within DSB Jurisdiction

2005
(Updated May 2009)

1 Project Name/Location For Which Firm Is Filing:
.

2. Project #

This space for use by Awarding Authority only.

3a. Firm (Or Joint-Venture) - Name And Address Of Primary Office To Perform The Work:

3e. Name Of Proposed Project Manager:
For Study: (if applicable)
For Design: (if applicable)

3b. Date Present And Predecessor Firms Were Established:

3f. Name And Address Of Other Participating Offices Of The Prime Applicant, If Different From Item 3a Above:

3c. Federal ID #:

3g. Name And Address Of Parent Company, If Any:

3d. Name And Title Of Principal-In-Charge Of The Project (MA Registration Required):

Email Address:
Telephone No: Fax No.:

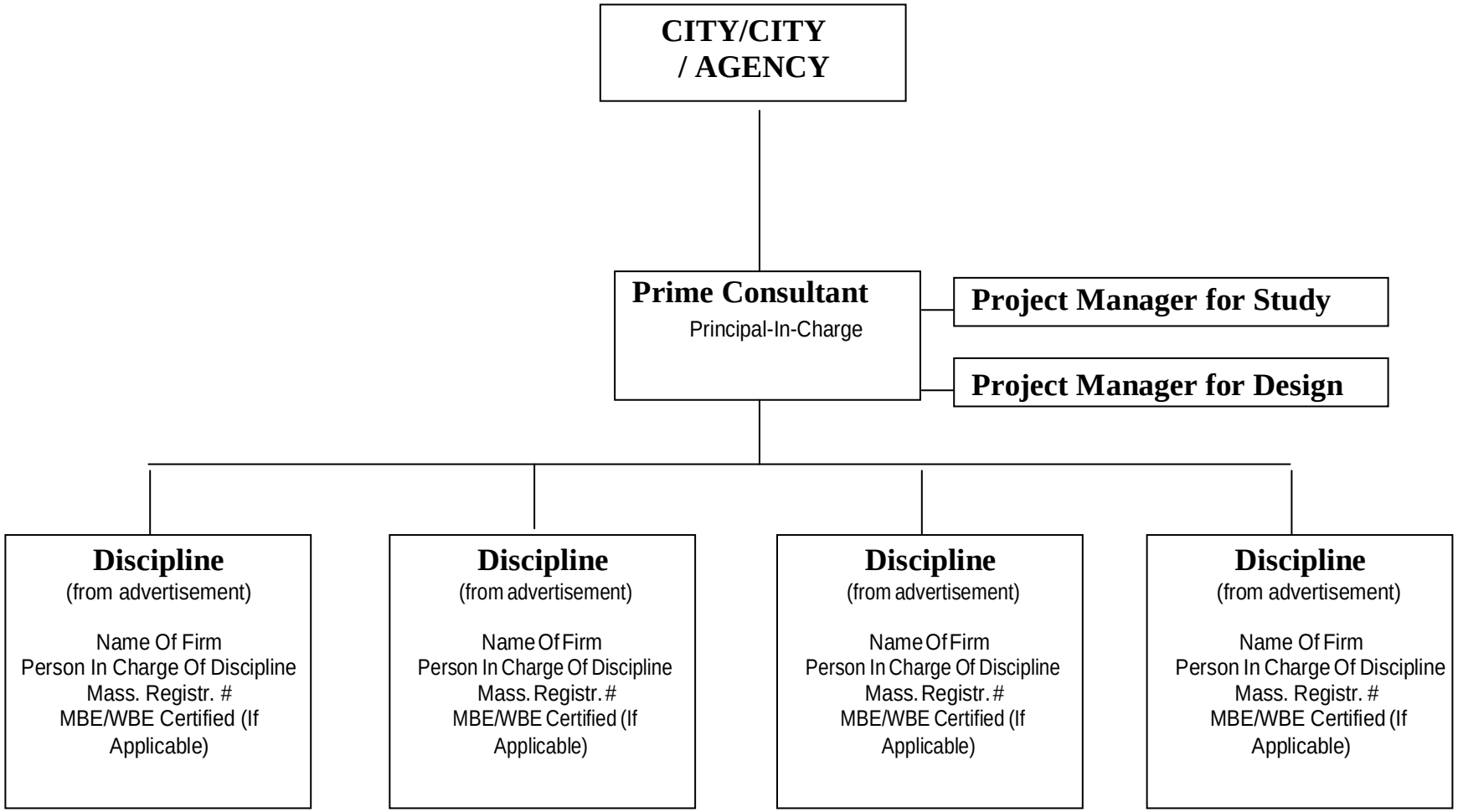
3h. Check Below If Your Firm Is Either:
(1) SOMWBA Certified Minority Business Enterprise (MBE) ❑
(2) SOMWBA Certified Woman Business Enterprise (WBE) ❑
(3) SOMWBA Certified Minority Woman Business Enterprise (M/WBE) ❑

4. Personnel From Prime Firm Included In Question #3a Above By Discipline (List Each Person Only Once, By Primary Function -- Average Number Employed Throughout The Preceding 6 Month Period. Indicate Both The Total Number In Each Discipline And, Within Brackets, The Total Number Holding Massachusetts Registrations):

Admin. Personnel (___) Ecologists (___) Licensed Site Profs. (___) **Other** ___ (___)
Architects (___) Electrical Engrs. (___) Mechanical Engrs. (___)___(___)
Acoustical Engrs. (___) Environmental Engrs. ___ (___) Planners: Urban./Reg. ___ (___)___(___)
Civil Engrs. ___ (___) Engr. Geologists ___ (___) Specification Writers ___ (___) ___ ___ (___)
Code Specialists ___ (___) Geotech. Engrs. ___ (___) Structural Engrs. ___ (___) ___ ___ (___)
Construction (___) Industrial Hygienists ___ (___) Surveyors (___)___(___)
___ (___) Cost Estimators ___ (___) Interior Designers ___ (___) ___ (___)
Drafters (___) Landscape Architects ___ (___) ___ (___) Total Personnel (___)

5. Has this Joint-Venture previously worked together? ❑ Yes ❑ No

6. List **ONLY** Those Prime And Sub-Consultant Personnel Specifically Requested In The Advertisement. This Information Should Be Presented Below In The Form Of An Organizational Chart. Include Name Of Firm And Name Of The One Person In Charge Of The Discipline, With Mass. Registration Number, As Well As MBE/WBE Status, If Applicable:



7.	Brief Resume Of **ONLY** Those Prime Applicant And Sub-Consultant Personnel Requested In The Advertisement. Confine Responses To The Space Provided On The Form And Limit Resumes To **ONE** Person Per Discipline Requested In The Advertisement. Resumes Should Be Consistent With The Persons Listed On The Organizational Chart In Question # 6. Additional Sheets Should Be Provided Only As Required For The Number Of Key Personnel Requested In The Advertisement And They Must Be In The Format Provided. By Including A Firm As A Sub-Consultant, The Prime Applicant Certifies That The Listed Firm Has Agreed To Work On This Project, Should The Team Be Selected.	
a.	Name And Title Within Firm:	a. Name And Title Within Firm:
b.	Project Assignment:	b. Project Assignment:
c.	Name And Address Of Office In Which Individual Identified In 7a Resides**:** MBE ❑ WBE ❑	c. Name And Address Of Office In Which Individual Identified In 7a Resides**:** MBE ❑ WBE ❑
d.	Years Experience: With This Firm:_____ With Other Firms: _____	d. Years Experience: With This Firm: _____ With Other Firms: _____
e.	Education: Degree(s)/Year/Specialization	e. Education: Degree(s)/Year/Specialization
f.	Active Registration: Year First Registered/Discipline/Mass Registration Number	f. Active Registration: Year First Registered/Discipline/Mass Registration Number
g.	Current Work Assignments And Availability For This Project:	g. Current Work Assignments And Availability For This Project:
h.	Other Experience And Qualifications Relevant To The Proposed Project: (Identify Firm By Which Employed, If Not Current Firm):	h. Other Experience And Qualifications Relevant To The Proposed Project: (Identify Firm By Which Employed, If Not Current Firm):

8a.	Current And Relevant Work By Prime Applicant Or Joint-Venture Members. Include **ONLY** Work Which Best Illustrates Current Qualifications In The Areas Listed In The Advertisement (List Up To But Not More Than 5 Projects).					
a.	Project Name And Location Principal-In-Charge	b. Brief Description Of Project And Services (Include Reference To Relevant Experience)	C. Client's Name, Address And Phone Number (Include Name Of Contact Person)	d. Completion Date (Actual Or Estimated)	e. Project Cost (In Thousands)	
					Construction Costs (Actual, Or Estimated If Not Completed)	Fee for Work for Which Firm Was Responsible
(1)						
(2)						
(3)						
(4)						
(5)						

8b. List Current And Relevant Work By Sub-Consultants Which Best Illustrates Current Qualifications In The Areas Listed In The Advertisement (Up To But Not More Than 5 Projects For Each Sub-Consultant). Use Additional Sheets Only As Required For The Number Of Sub-Consultants Requested In The Advertisement.					
Sub-Consultant Name:					
a. Project Name And Location Principal-In-Charge	b. Brief Description Of Project And Services (Include Reference To Relevant Experience	c. Client's Name, Address And Phone Number. Include Name Of Contact Person	d. Completion Date (Actual Or Estimated)	e. Project Cost (In Thousands)	
				Construction Costs (Actual, Or Estimated If Not Completed)	Fee For Work For Which Firm Was/Is Responsible
(1)					
(2)					
(3)					
(4)					
(5)					

9. List All Projects Within The Past 5 Years For Which Prime Applicant Has Performed, Or Has Entered Into A Contract To Perform, Any Design Services For All Public Agencies Within The Commonwealth.

(Add/subtract rows or pages as needed)

Role P, C, JV *	Phases St., Sch., D.D., C.D.,A.C.*	Project Name, Location And Principal-In-Charge	Awarding Authority (Include Contact Name And Phone Number)	Construction Costs (Actual, Or Estimated If Not Completed)	Completion Date (Actual or Estimated) (R)Renovation or (N)New
		1.			
		2.			
		3.			
		4.			
		5.			
		6.			
		7.			
		8.			
		9.			
		10.			
		11.			
		12.			

* P = Principal; C = Consultant; JV = Joint Venture; St. = Study; Sch. = Schematic; D.D. = Design Development; C.D. = Construction Documents; A.C. = Administration of Contract

10. Use This Space To Provide Any Additional Information Or Description Of Resources Supporting The Qualifications Of Your Firm And That Of Your Sub-Consultants For The Proposed Project. If Needed, Up To Three, Double-Sided 8 ½" X 11" Supplementary Sheets Will Be Accepted. **APPLICANTS ARE REQUIRED TO RESPOND SPECIFICALLY IN THIS SECTION TO THE AREAS OF EXPERIENCE REQUESTED IN THE ADVERTISEMENT**.

11. Professional Liability Insurance:

Name of Company	Aggregate Amount	Policy Number	Expiration Date

12. Provide A List Of All Projects On Which Monies Were Paid By You, Or On Your Behalf, As A Result Of Professional Liability Claims Occurring Within The Last 5 Years And In Excess Of $50,000 Per Incident. Please Include Project, Client Names And Explanation. (Attach Separate Sheet If Necessary): **PLEASE ANSWER "YES" or "NO". IF "YES" PLEASE GIVE DETAILS.**

13. Name Of Sole Proprietor Or Names Of All Firm Partners And Officers:

Name	Title	MA Reg #	Status/Discipline	Name	Title	MA Reg #	Status/Discipline
a.				d.			
b.				e.			
c.				f.			

14. If Corporation, Provide Names Of All Members Of The Board Of Directors:

Name	Title	MA Reg #	Status/Discipline	Name	Title	MA Reg #	Status/Discipline
a.				d.			
b.				e.			
c.				f.			

15. Names Of All Owners (Stocks Or Other Ownership):

Name And Title	% Ownership	MA. Reg.#	Status/Discipline	Name And Title	% Ownership	MA. Reg.#	Status/Discipline
a.				d.			
b.				e.			
c.				f.			

16. I hereby certify that the undersigned is an Authorized Signatory of Firm and is a Principal or Officer of Firm. I further certify that this firm is a "Designer", as that term is defined in Chapter 7, Section 38A1/2 of the General Laws, or that the services required are limited to construction management or the preparation of master plans, studies, surveys, soil tests, cost estimates or programs. The information contained in this application is true, accurate and sworn to by the undersigned under the pains and penalties of perjury.

Submitted by _____ Printed Name and Title _____ Date _____
(Signature)

APPENDIX 1

Conceptual Design – Anaerobic Digesters at Greenfield Wastewater Treatment Plant

D

CommonWealth

Resource Management

Corporation

March 22, 2019

Marlo M. Warner II
Director of Public
Works Town of
Greenfield
189 Wells Street, Greenfield, MA 01301

Mark Holley
Water/Wastewater
Superintendent Town of
Greenfield
14 Court Square
Greenfield, MA 01301

RE: Greenfield Only conceptual level design and preliminary economics of an anaerobic digestion project at the Town of Greenfield Waste Water Treatment Facility

Dear Gentlemen,

CommonWealth Resource Management Corporation (CRMC) is pleased to provide this letter report to assist the Town of Greenfield (herein the "Client") in modifying the conceptual level design and preliminary economics of a modestly sized anaerobic digestion project at the Greenfield Waste Water Treatment Plant, which assessment CRMC had provided to Client in a December 7, 2018 report (the Greenfield AD Regional Project Report). The modification to the project involves accepting and processing sludge that is generated from the Greenfield waste water treatment facility only rather than serving the region.

CRMC analyzed the preliminary economics of an AD project designed to accept sludge only from the Greenfield Waste Water Treatment Plant (herein "the Greenfield Project"). The analysis is based upon capacity to accept and digest 2.1 million gallons per year sludge at 5% solids, with production of 100 kW of electric power CRMC's analysis relies heavily on the Greenfield AD Regional Project Report. CRMC modified the original conceptual design and size from that Report to meet the much smaller quantity of on-site generated sludge requiring disposal. CRMC estimated capital costs for the modified facility based upon estimates of capital costs for the Greenfield AD Regional Project Report as adjusted for the scaled-down facility, and accounting for CRMC experience developing and installing a similar modestly-sized AD facility, the CRMC Bioenergy Facility. CRMC also prepared economic pro formas to determine the debt service that would result from bond funding of the project capital cost for alternative terms of 15 to 30 years, and projected revenues, operating expenses, cash flows (without depreciation and tax effects), and value of avoiding sludge disposal and electricity purchase costs. The objective was to determine under what

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conditions could this size project meet conventional financing criteria – that is, have net income that exceed debt service by at least 20 percent, which implies a debt service coverage ratio of 1.20 -- and to determine how sludge disposal costs required to support the project under various scenarios compare to existing costs and potential future sludge disposal costs at external facilities at market prices.

Specifically, the resized Greenfield Project would modify the existing operation, site and infrastructure at the Greenfield WWTP by adding equipment and facilities to

1. Accept liquid sludge only from the Greenfield WWTP into an anaerobic digestion (AD) facility.
2. Operate the AD facility in order to generate bio-gas and reduce the volume of materials requiring off-site disposal.
3. Accept pumpable source-separated organic material (e.g. FOG and slurried food waste) to supplement the WWTP sludges as a feedstock for the AD facility, thereby generating (1) additional tipping fee revenues for the Greenfield Project, and (2) higher levels of bio-gas.
4. Use the bio-gas to fuel an engine-generator to serve electric and thermal loads of the Greenfield Project and the electric load of the Greenfield WWTP.
5. Construct and operate the Greenfield Project on a basis that revenues from disposal fees, renewable energy credits and avoided energy costs exceed operating costs and debt service, and the surplus together with the savings from avoided sludge transportation and disposal costs provides a reasonable payback on the capital investment in the Greenfield Project.

Based on the results of this alternative analysis, CRMC offers the following findings:

- A resized and modified conceptual design capable of managing Greenfield WWTP sludge and a small quantity of other organic materials, such as FOG, is estimated to require approximately a $4.1 million investment.

- The results of the pro forma economic analysis indicate that the Greenfield Project, if developed, constructed and operated as projected under base and favorable conditions, could meet conventional financing criteria and provide substantial savings to Greenfield at a $0.14 per gallon sludge disposal fee with no annual escalation versus Greenfield's current fee of $0.23 per gallon with uncertain escalation. A $0.14 per gallon sludge disposal fee was chosen as a potential market rate for disposing of Greenfield sludge at an off-site disposal facility that may be available assuming a $0.07 per gallon transport cost and $0.07 per gallon disposal fee.

- Under the base case conditions, fees of $0.14 per gallon of sludge levelized could maintain a 1.2 debt service coverage ratio over minimum term of 25 years. A shorter- term financing would require higher disposal fees than $0.14 per gallon of sludge to maintain a 1.2 debt service coverage ratio. Specifically, a 20-year term would require $0.16 per gallon of sludge, and a 15-year term would require $0.20 per gallon of

sludge.

- Under the favorable case conditions, fees of $0.14 per gallon of sludge could maintain a
  1.2 debt service coverage ratio for terms over 15- to 30-years if the project were supported with $1,000,000 in grant funding (not requiring repayment). Debt that is obtained for 20- to 30-year terms could be supported with lower fees than $0.14 per gallon of sludge that would result in savings compared to an off-site management alternative at $0.14 per gallon.

- Under unfavorable case conditions, fees of $0.14 per gallon of sludge would not maintain a 1.2 debt service coverage ratio for terms of 15 to 30 years. Rather, the current fee of
  $0.23 per gallon of sludge management cost that Greenfield WWTP is incurring would be required to support the financing of the Greenfield Project over a minimum 20-year financing term, and this fee would have to escalate at 1.5% annually.

The remainder of this letter report (1) describes the modified conceptual design and performance of the anaerobic digestion system to process the sludge generated by the Greenfield WWTP, and
(2) assesses the economics of the Greenfield Project on a preliminary basis to determine if and under what conditions the Greenfield Project would be economically viable.

The Greenfield Project

CRMC established a conceptual design of the Greenfield Project to be located at available space within the site of the Greenfield WWTP. Project operations would be integrated within the existing operations of the Greenfield WWTP. The Greenfield Project would provide capacity to manage sludge from the Greenfield WWTP only, and would provide a modest quantity of disposal capacity for pumpable source-separated organic material such as septic waste, fats, oils and grease (FOG), and slurried food waste. The Greenfield Project would generate biogas to generate electricity and heat for use internally by the Greenfield Project and by the Greenfield WWTP.

A preliminary layout of the Greenfield Project is shown in Figure 1, Greenfield Project General Arrangement. This layout could be placed as shown or reconfigured at one of two locations on- site including an available area located north of the existing disinfection building, or available area east of the existing disinfection building. Both these areas could support expansion of the Greenfield Project.

The Greenfield Project would be comprised of facilities to receive WWTP sludge generated on- site, septic waste received on-site in two 2,000-gallons tanks, and source-separated organic material (e.g. fats, oils and grease) in pumpable form that is generated by off-site sources. The Greenfield Project would convert these materials into biogas, renewable electricity, thermal energy, and residual products including liquids and solids. The liquids would be returned to the Greenfield WWTP headworks. Solids would either be taken to a compost operation at the old Greenfield landfill; marketed to local soil aggregators that would use the solids as an amendment to soil products; or sent to other appropriate facilities for disposal. The biogas, renewable electricity, and thermal energy would be used

to meet Greenfield Project electric and thermal loads and to meet some portion of the Greenfield WWTP electric loads.

CRMC established the capacity of the Greenfield Project to accept and process the entire 5,715 gallons per day of existing sludge generated by the Greenfield WWTP. The Greenfield Project could accept 1,000 gallons per day of additional source-separated organic material generated by and brought in from off-site sources. These feedstocks could produce biogas quantities sufficient to generate approximately 100 kW of electric power and 0.4 MMBtu per hour of recovered thermal energy from a small gas engine-generator on a continuous basis. This level of electric power and heat production would supply 30 kW to meet all the electric loads of the Greenfield Project, and up to 70 kW of the 127-kW electric load of the Greenfield WWTP.

The new facilities that would comprise the Greenfield Project include (1) a 40,000-gallon-underground tank for receipt, screening, mixing, heating and storage of feedstocks, (2) two 100,000-gallon anaerobic digesters (Digesters) to provide a total of 200,000 gallons of capacity,
(4) a 40,000-gallon digestate storage tank, (5) a dewatering system, and (6) a renewable energy power and thermal production system (the engine-generator set and auxiliary equipment), all as shown in Figure 1 – Greenfield Project General Arrangement. The Greenfield Project would operate continuously, although only required to be staffed during a five (5) days per week operating schedule (8 hours per weekday) consistent with the existing operating schedule of the Greenfield WWTP.

Figure 2 is a Process Flow Diagram that shows the sequence of material and energy flow through the Project. Figure 2 -- labeled with letters A through H -- correspond to the order of the descriptions of the individual Greenfield Project components. Figure 3 is a Mass Balance that shows the quantities of material flows and power production through the process. Table 1 summarizes the dimensions of the systems and equipment described below.

As shown in Figure 2, the Greenfield Project incorporates the following systems and functions:

- (A) Existing On-site Feedstock Storage System. All sludge generated by the Greenfield WWTP would continue to be stored in the existing 40,000-gallon tank to be thickened. Thickened sludge would be transferred to an existing 9,000-gallon load-out tank or directly transferred to the Feedstock Receiving/Screening System.

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- (B) Incoming septage and FOG wastes: All septic waste would continue to be received in two 2,000-gallon underground storage tanks. The septic waste is passed through a Raptor screen to remove trash from the septic waste. After screening, septic waste would be transferred to the Feedstock Receiving/Screening System. FOG would be received from liquid waste tanker vehicles and transferred to the Feedstock Receiving/Screening System.

- (C) Feedstock Receiving/Screening System. Receipt of other organic wastes delivered by tanker vehicles would take place at a cement-paved and partially-covered delivery location. The feedstocks would be received, and gravity-fed into underground storage tanks with the capacity of 40,000 gallons. Thickened sludge

from the Greenfield WWTP would be delivered by pipe directly into the underground storage tanks. All pumpable feedstocks would be screened for removal of tramp materials and then stored in the 40,000-gallon underground storage tanks. The storage tank would contain mechanical or hydraulic mixing equipment, a heating system, a pump and an automated screen. Material from the storage tank would be pumped into the Digesters

- (D) The Anaerobic Digesters would convert organic material into a biogas that can be used to generate energy. Two insulated 100,000-gallon glass-fused metal tanks would receive mixed and heated feedstock from the Feedstock Receiving/Screening System (C) at a rate of approximately 6,700 gallons per day including approximately 5,700 gallons per day of sludge and septic waste, and 1,000 gallons of other liquid organic material. The material in this tank (referred to as "digestate") would undergo a process of continuous feed, wet, mesophilic anaerobic digestion that would support the balance of microbial populations required to efficiently convert organic materials into biogas and stabilized digestate. The contents of the Digesters would be heated using thermal energy produced by the Renewable Energy Plant (G) to maintain a temperature 98 degrees Fahrenheit and would be continuously mixed internally for a residence time of approximately 30 days. The continuous mixing would occur through the action of a hydraulic mixing system that uses high-pressure floor- and wall-mounted nozzles to create a cyclonic swirl within the tank. The pump and heating equipment would be external to the tank to make maintenance of the equipment readily accessible and serviceable

  Together, the Digesters are expected to produce biogas at a rate of approximately 1.1 million Btus ("MMBtu") per hour. Biogas would be drawn from the Digesters via valved outlets at the top of the tanks, which would be outfitted with emergency pressure release valves. The biogas would be piped to the Renewable Energy Plant (G) to produce renewable electricity and thermal energy. Approximately 6,360 gallons per day of stabilized digestate would also be produced by the Digester and would be pumped to the Dewatering System (F) to make a solids product. The Digesters would each stand 26 feet in diameter and would rise 27 feet above grade.

  The advantages of using two 100,000-gallon Digesters in place of a single 200,000-gallon digester include: (a) providing for continued processing capacity in the event of equipment malfunctions or the collapse of the microbial communities within a Digester; and (b) enabling one Digester to reseed the malfunctioned Digester and thereby facilitate its return to operating.

- (E) The Spent Digestate Storage Tank, with a capacity of 40,000 gallons, would receive and temporarily store stabilized digestate from the Digesters (D). The biogas would be drawn from the Spent Digestate Storage Tank via valved outlets at the top of the tank. The tank, located underground, would have dimensions of 15 feet by 40 feet.

  A process building with an approximate rectangular footprint of 900 square feet would be constructed adjacent to the tanks. The process building would be comprised of two levels. The first level would be dedicated to valves and piping that connect the tanks and process equipment. Should a flood event occur at the Greenfield WWTP, the first

floor would not contain equipment that could become damaged from infiltration of flood waters. The second level would be dedicated to the process equipment and systems including the Renewable Energy System, the Dewatering System, tools and spare parts area, and monitoring and control system for the Greenfield Project. The second level would be constructed above the high flood level mark to protect the process equipment from a flooding event.

- (F) The Dewatering System would consist of dewatering equipment housed in an area of 300 square feet in the second level area of the building to separate the solids and water fractions of the digestate generated through anaerobic digestion. The resulting water would be pumped to the headworks of the Greenfield WWTP. The solid fraction would be stored in roll-off containers for transport to an off-site composting process, a soils manufacturer or a disposal facility. The solids processing, which would be performed entirely within this enclosed building, would produce approximately 2.8 wet tons per day of material at 25% solids content or 0.7 dry tons of solid product per day.

  The digestion process would provide biosolids that could meet Class B biosolids standards under the USEPA 40 CFR Part 503 regulations. Specifically, anaerobic digestion is a process identified under 40 CFR Part 503 regulations to produce Class B biosolids but must maintain the mean cell residence time and temperature between 15 days at 95-degrees F to 60 days at 68-degrees F. Further composting of the biosolids could result in the biosolids attaining the Class A biosolids standard.

- (G) The Renewable Energy System would consist of an engine-generator set housed in an area of 250 square feet in the 900-square-foot second-level area of the building to produce renewable energy, including up to 100 Kilowatts (“kW”) of power and 0.4 MMBtu per hour of recovered thermal energy using the biogas fuel produced in the Digesters (D).

  The thermal energy would be recovered on-site to provide space heating and process heat for all operations at the Greenfield Project. The thermal energy would be recovered from the jacket water that maintains the temperature of the engine, and a waste heat recovery unit on the exhaust gas. Recovered thermal energy would be used to heat the Feedstock Receiving/Screening System, the Anaerobic Digesters, the cement paved receiving area, and the building space. The large thermal loads would include 0.013 MMBtu per hour to heat the feedstock from 50 degrees to 98 degrees F, and 0.071 MMBtu per hour to maintain temperature of the Digesters at 98 degrees F with an ambient temperature at -10 degrees F. Additional thermal loads would include heating the interior of the building and the concrete pad overlying the receiving area.

  The 100 kW of power would be used for on-site power uses of the Greenfield Project (approximately 30 kW) and a portion of the on-site power requirements of the WWTP (approximately 127 kW). Combustion air required by the engine generator at the Renewable Energy Plant would be extracted from the Greenfield Project buildings and tankage to control potential odors that may be associated with Greenfield Project operations.

- (H) Environmental Controls: To prevent the potential for fugitive odors, all receiving

and storage of organic feedstocks and digestate would be accomplished within enclosed tanks, and associated piping. The air from the building and process tankage would be vented to the Renewable Energy Plant (G) to be used as combustion air in the engine-generators. The combustion would destroy any contaminants in the air that might be odorous. When the Renewable Energy System is unavailable for any reason to combust biogas, a flare would be available to combust the biogas and vented air.

The Greenfield Project Economics

CRMC assessed the preliminary economics of the Greenfield Project by preparing an economic pro forma to estimate the investment required, revenues, expenses, net income and debt service. Avoided costs of electricity are shown as revenues to the Greenfield Project for purposes of assessing the economic viability of the Greenfield Project. The economic analysis is based upon the total investment being funded by AA- rated debt at a 3.5% interest rate for 15-year term, 3.6% for 20-year term, 3.7% for 25-year term and 3.8% for 30-year term and achieving a minimum of a 1.2 debt service ratio (net income/levelized debt payments). The assumptions for three cases (a base, favorable and unfavorable cases) are shown in Table 2, Alternative Cases for Preliminary Economics.

CRMC assessed the performance of the Greenfield Project economics for three cases by (1) calculating the debt service ratio for 15, 20, 25 and 30 year debt terms at a sludge disposal fee of
$0.14 per gallon to determine if the minimum debt service ratio of 1.2 can be achieved, and (2) calculating the equivalent disposal fee for Greenfield WWTP sludge that would be required under each of the scenarios to achieve a debt service ratio of 1.2. A summary of the results from this assessment are shown in Table 3.

An economic pro forma was developed for three cases including (1) a Base Case, as shown in Table 4, that projects the economics under a reasonable set of market assumptions, (2) a Favorable Case, as shown in Table 5, that projects the economics under a set of market conditions that are plausible and would benefit the economics of the Greenfield Project, and (3) a Unfavorable Case, as shown in Table 6, that projects the economics under a set of market conditions that are plausible and would not benefit the economics of the Greenfield Project. For all cases, a build-up of the investment requirement is shown in Table 7.

The Greenfield Project Conclusions and Recommendations

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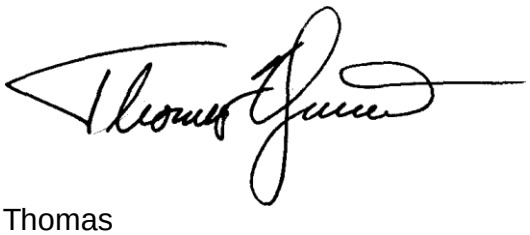
The Greenfield Project offers the potential to achieve the objectives stated by the Client including reducing the quantity of sludge requiring disposal, providing a modest quantity of disposal capacity for pumpable source-separated organic material such as FOG or food waste, and generating sufficient quantities of biogas to be used to generate electricity and heat for use by the Greenfield Project and the Greenfield WWTP. The Greenfield Project could (1) provide an opportunity for the Client to manage sludge generated by Greenfield WWTP and other source-separated organic material in pumpable form generated in the area, and (2) protect the Client from sludge disposal being unavailable in the future, or if available, from exposure to elevated and uncontrollable costs of sludge transportation and disposal. The economics for the Base Case are reasonable if the investment is funded by low-cost debt over a minimum of a 25-year term, and Greenfield pays $0.14 per gallon for sludge disposal at the Greenfield Project. If available, grants might be acquired to reduce

the up-front investment that the Town would otherwise have to fund, which would provide some protection to the Client against occurrence of Greenfield Project risks and the conditions described as unfavorable. Substantial amounts of grant funding could result in lowering sludge disposal fees to less than $0.14 per gallon.
Therefore, CRMC recommends that if the Client pursues the Greenfield Project, the Client should seek grant funding to reduce the investment that would be required by the Town, with a target for grant funding of at least the 25- percent level. This level of financial subsidy would increase the likelihood of success in maintaining surplus cash flows and reasonable sludge disposal fees under the likely future market scenarios.

Please feel free to call me with questions at (508) 339-

3074. Sincerely,



Thomas
Yeransian
Principal

Attachments

Figure 1 Greenfield Project General
Arrangement Figure 2 Process Flow Diagram
Figure 3 Mass Balance

Table 1: Summary System Dimensions
Table 2: Alternative Cases for Preliminary Economics
Table 3: Summary of Preliminary Economic Results
Table 4: Greenfield Project Pro Forma Economics: Base Case
Table 5: Greenfield Project Pro Forma Economics: Favorable Case
Table 6: Greenfield Project Pro Forma Economics: Unfavorable Case Table 7: Investment Details and Basis

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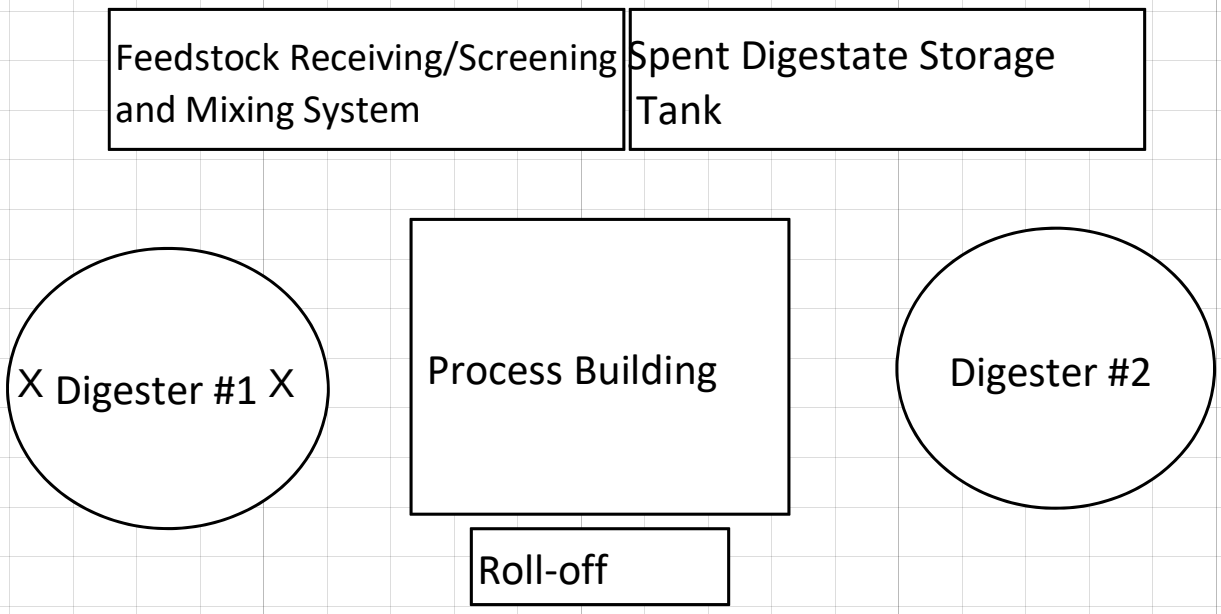
FIGURE 1: GENERAL ARRANGEMENT - GREENFIELD PROJECT



Scale: Grid line = 5 feet

Note: Boxed area is 105 feet X 70 feet or 7,350 square feet.

FIGURE 2

PROCESS FLOW DIAGRAM OF THE GREENFIELD PROJECT

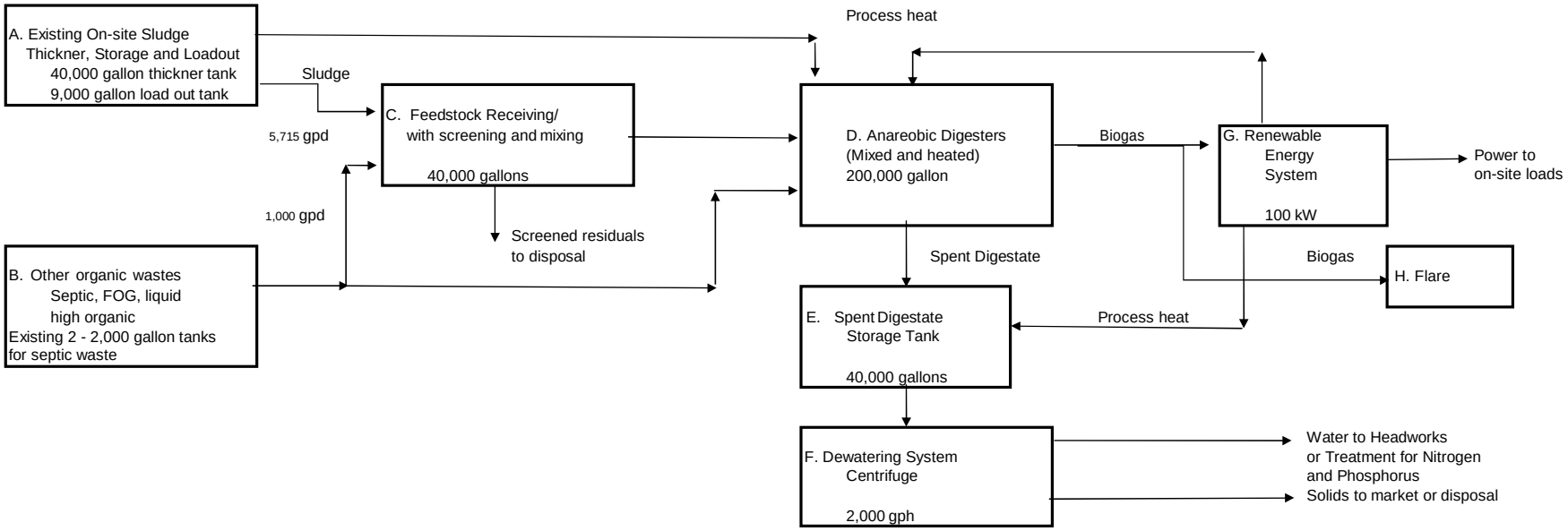


FIGURE 3 - MASS BALANCE

A simple mass balance for a mesophilic CSTR low solids digester

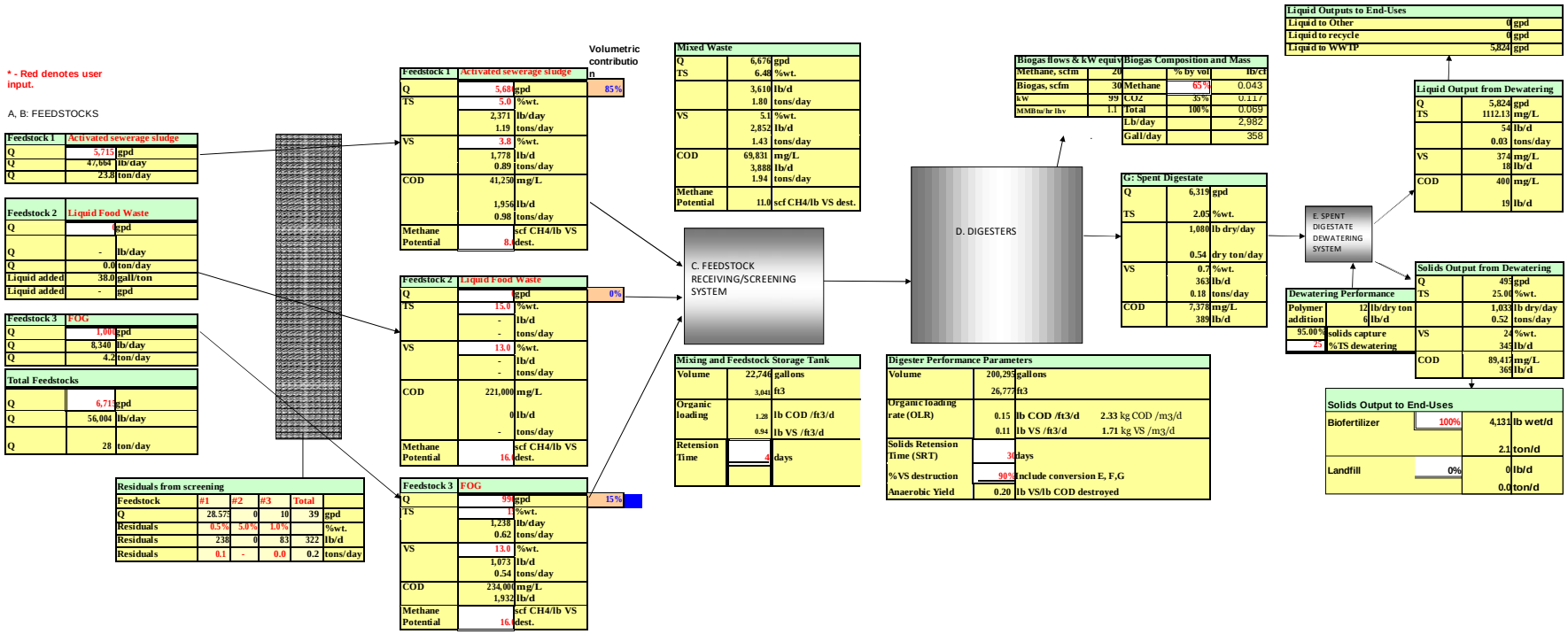


TABLE 1

DIMENSIONS OF TANKS, BUILDING AND EQUIPMENT

TANKS, BUILDING, EQUIPMENT	Functional Storage Volume, Gallons	Height, feet	Freeboard, feet	Diameter or lengths, feet	Bottom area, square feet	Calculated Capacity Volume, cubic feet	Calculated Capacity Volume, Gallons	Actual Capacity wilth Freeboard Volume,	Actual Capacity wilth Freeboard Volume, Gallons	Storage capacity, days
Feedstock storage										
Underground	40,841	12	1.6	15 X 40	525	6,300	47,124	5,460	40,841	6.1
Digester										
#1 above ground	100,593	26	2.5	27	572	14,879	111,294	13,448	100,593	30.0
#2 above ground	100,593	26	2.5	27	572	14,879	111,294	13,448	100,593	30.0
Digestate storage										
Above ground	40,841	12	1.6	15 X 40	525	6,300	47,124	5,460	40,841	6.1
Roll Off	9,000	6.8			184	1,257	9,405	1,257	9,405	
Building footprint					900					
Renewable Energy System					250					
Dewatering System					300					
Pump station					260					

TABLE 2: Alternative Cases for Preliminary Economics

Parameter	Base Case	Favorable Case	Unfavorable Case
Investment assumptions	$4.1 million with no grants, Includes allowances for pre-construction costs, construction costs, and financing costs.	$4.1million with grants of up to $1.0 million to lower financed amount to $3.1 million	Same as Base case
Revenue Assumptions			
Sludge disposal fee	2.1 million gallons of pumpable sludge annually from Greenfield WWTP at $0.14 per gallon[1]. No escalation.	Same as Base case	Same as Base case
Organic material disposal fees	0.65 million gallons of FOG from area liquid waste haulers at $0.10 per gallon escalating at 3% annually	Same as Base Case	$0.07 per gallon and no escalation
Power	Avoided cost of $133.70 per MWh for 70 kW equivalent to $75,000 annually escalating at 2% annually.	Same as Base Case escalating at 4% annually	Same as Base Case but no escalation
MA Class 1 REC sales	$15 per MWh and no escalation	$30 per MWh with no escalation	Same as Base Case
MA APS RECs sales	36% thermal recovery, and $18.50 per MWh and no escalation	Same as Base case but $20.00 per MWh	Same as Base Case
Digestate to biofertilizer market	None. Possible future revenue source but too uncertain to quantify.	Same as Base Case.	Same as Base Case
Attributes such as eRINs and carbon credit sales	None. Possible future revenue source but too uncertain to quantify.	Same as Base Case.	Same as Base Case
Expense Assumptions			
AD labor and management	Use of existing staff and management with no incremental labor cost.	Same as Base Case	Incremental labor of 1 full time employees annually at $56,025 (wages and benefits) each escalating at 2% annually
Supplies and outside services	$33,000 escalating at 2% annually.	Same as Base Case	Same as Base Case
Repairs	$25,000 allowance escalating at 2% annually.		
Residual disposal	Screenings: $100 per ton escalating at 2% annually for	Same as Base Case	Same as Base Case solid digestate of 882 TPY transport and dispose in

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[1] $0.14 per gallon is comparable to prospective alternative off-site disposal of $0.07 per gallon plus $0.07 per gallon transportation, but much less than current arrangements at $0.23 per gallon of sludge ($0.18 per gallon disposal plus $0.05 per gallon transport).

TABLE 2: Alternative Cases for Preliminary Economics

Parameter	Base Case	Favorable Case	Unfavorable Case
	transport and disposal of screenings of 57 tons per year. Solid digestate: 882 tons per year transported to Greenfield compost area at old landfill at $15 per transport and $0 cost disposal. Spent digestate liquid: 2.1 million gallons of spent digestate filtrate to WWTP headworks at no cost.		LF at $100 per ton escalating at 2%.
O&M power plant	$25 per MWhr escalating at 2% annually	Same as Base case	Same as Base case
Incremental Administration and Insurance	$30,000 annually escalating at 2% annually	Same as Base Case	Same as Base Case
Project Economic Results:	***At 100% Debt Financing of Project***		
Sludge disposal fee of $0.14 per gallon to service 100% AA rated debt financed at interest rates of: 3.5% - 15 year, 3.6% - 20 Year, 3.7% - 25 year, and 3.8% - 30 year at or >1.2 debt service ratio. [2]	Requires 25-year term or greater of debt financing to meet 1.2 debt service ratio.	Requires 15-year term or greater of debt financing to meet 1.2 debt service ratio.	Not financeable unless increase disposal fee to meet the 1.2 debt service ratio. Requires $0.23/gallon escalating at 1.5% and minimum 20-year debt term to be financeable.
Potential first year savings over existing sludge management for Greenfield	$188,000 plus surplus cash for 25-year debt term at 3.7% interest.	$279,000 plus surplus cash for 25-year debt term at 3.7% interest.	None

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[2] Greenfield face a cost of $480,000 for fiscal year 2019 to transport and disposal of its 2.1 million gallons per year of sludge at an average solids content of 5 percent.

TABLE 3: SUMMARY OF PRELIMINARY ECONOMIC RESULTS				
BASE CASE				
with fee of $0.14 per gallon of Greenfield Sludge and $292,000 disposal fee annually with no escalation				
Debt term, years	15	20	25	30
Rate, %	3.5%	3.6%	3.7%	3.8%
Debt amount, $	$4,174,674	$4,143,663	$4,128,163	$4,120,375
Levelized annual debt payment, $	$362,466	$294,197	$255,939	$232,529
Debt service ratio (Net Income/levelized annual debt payment)	0.8	1.0	1.2	1.3
Surplus 1st Year Cash, $	Deficit	$10,000	$48,000	$71,000
Meets 1.2 debt service converage (Yes or No)	No	No	Yes	Yes
BASE CASE				
with calculated Greenfield sludge disposal fee to attain 1.2 debt service ratio				
Debt term, years	15	20	25	30
Rate, %	3.5%	3.6%	3.7%	3.8%
Debt amount, $	$4,174,850	$4,143,941	$4,128,163	$4,120,380
Levelized annual debt payment, $	$362,482	$294,217	$255,939	$232,530
Debt service ratio (Net Income/levelized annual debt payment)	1.2	1.2	1.2	1.2
Surplus 1st Year Cash, $	$72,000	$59,000	$48,000	$47,000
Financeable (Yes or No)	Yes	Yes	Yes	Yes
Greenfield Sludge disposal fee, $/gallon with no escalation	$0.20	$0.16	$0.14	$0.13
Greenfield Sludge disposal fee, $ with no escalation	$423,253	$341,353	$292,000	$267,329
Annual Escalation, %	0%	0%	0%	0%
FAVORABLE CASE				
with fee of $0.14 per gallon of Greenfield Sludge and $292,000 disposal fee annually with no escalation				
Debt term, years	15	20	25	30
Rate, %	3.5%	3.6%	3.7%	3.8%
Debt amount, $	$3,089,770	$3,066,799	$3,055,193	$3,049,453
Levelized annual debt payment, $	$268,270	$217,740	$189,417	$172,093
Debt service ratio (Net Income/levelized annual debt payment)	1.2	1.5	1.7	1.8
Surplus 1st Year Cash, $	$50,000	$101,000	$129,000	$146,000
Meets 1.2 debt service converage (Yes or No)	Yes	Yes	Yes	Yes
FAVORABLE CASE				
with calculated Greenfield sludge disposal fee to attain 1.2 debt service ratio				
Debt term, years	15	20	25	30
Rate, %	3.5%	3.6%	3.7%	3.8%
Debt amount, $	$3,089,770	$3,066,799	$3,055,193	$3,049,453
Levelized annual debt payment, $	$268,270	$217,740	$189,417	$172,093
Debt service ratio (Net Income/levelized annual debt payment)	1.2	1.2	1.2	1.2
Surplus 1st Year Cash, $	$50,000	$44,000	$38,000	$34,000
Financeable (Yes or No)	Yes	Yes	Yes	Yes
Greenfield Sludge disposal fee, $/gallon with no escalation	$0.14	$0.11	$0.10	$0.09
Greenfield Sludge disposal fee, $ with no escalation	$292,037	$234,990	$201,002	$180,213
Annual Escalation, %	0%	0%	0%	0%
UNFAVORABLE CASE				
with fee of $0.14 per gallon of Greenfield Sludge and $292,000 disposal fee annually with no escalation				
Debt term, years	15	20	25	30
Rate, %	3.5%	3.6%	3.7%	3.8%
Debt amount, $	$4,174,850	$4,143,774	$4,128,165	$4,120,375
Levelized annual debt payment, $	$362,482	$294,205	$255,939	$232,529
Debt service ratio (Net Income/levelized annual debt payment)	0.4	0.5	0.6	0.7
Surplus 1st Year Cash, $	Deficit	Deficit	Deficit	Deficit
Meets 1.2 debt service converage (Yes or No)	No	No	No	No
UNFAVORABLE CASE				
with calculated Greenfield sludge disposal fee to attain 1.2 debt service ratio throughout term				
Debt term, years	15	20	25	30
Rate, %	3.5%	3.6%	3.7%	3.8%
Debt amount, $	$4,174,850	$4,143,774	$4,128,219	$4,120,375
Levelized annual debt payment, $	$362,482	$294,205	$255,943	$232,529
Debt service ratio (Net Income/levelized annual debt payment)	1.2	1.2	1.2	1.2
Surplus 1st Year Cash, $	$72,000	$59,000	$51,000	$47,000
Financeable (Yes or No)	Yes	Yes	Yes	Yes
Greenfield Sludge disposal fee, $/gallon 1st year with annual escalation	$0.27	$0.23	$0.21	$0.20
Greenfield Sludge disposal fee, $ 1st year with annual escalation	$566,767	$484,835	$438,937	$410,825
Annual Escalation, %	1.5%	1.5%	1.5%	1.5%

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TABLE 4: PROJECT ECONOMICS: BASE CASE (100% DEBT FINANCED)																	
YEAR:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Revenues																	
Organic material disposal fee		$ 36,500	$ 37,595	$ 38,723	$ 39,885	$ 41,081	$ 42,314	$ 43,583	$ 44,890	$ 46,237	$ 47,624	$ 49,053	$ 50,525	$ 52,040	$ 53,601	$ 55,210
Greenfield sludge disposal fee		$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037
Other WWTP sludge disposal fee		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Digestate solids sales		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Power (avoided cost) and RECs sales		$ 103,824	$ 105,329	$ 106,864	$ 108,430	$ 110,028	$ 111,657	$ 113,319	$ 115,014	$ 116,743	$ 118,507	$ 120,305	$ 122,140	$ 124,012	$ 125,921	$ 127,868
Total		$ 432,360	$ 434,960	$ 437,623	$ 440,351	$ 443,145	$ 446,007	$ 448,938	$ 451,941	$ 455,017	$ 458,167	$ 461,395	$ 464,701	$ 468,089	$ 471,559	$ 475,114
Expenses																	
Operations AD		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operations Power Plant		$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765
Supplies and Outside Services		$ 32,926	$ 33,585	$ 34,256	$ 34,941	$ 35,640	$ 36,353	$ 37,080	$ 37,822	$ 38,578	$ 39,350	$ 40,137	$ 40,939	$ 41,758	$ 42,593	$ 43,445
Repairs		$ 25,000	$ 25,500	$ 26,010	$ 26,530	$ 27,061	$ 27,602	$ 28,154	$ 28,717	$ 29,291	$ 29,877	$ 30,475	$ 31,084	$ 31,706	$ 32,340	$ 32,987
Residuals disposal		$ 18,926	$ 19,304	$ 19,691	$ 20,084	$ 20,486	$ 20,896	$ 21,314	$ 21,740	$ 22,175	$ 22,618	$ 23,071	$ 23,532	$ 24,003	$ 24,483	$ 24,972
Administration		$ 10,000	$ 10,200	$ 10,404	$ 10,612	$ 10,824	$ 11,041	$ 11,262	$ 11,487	$ 11,717	$ 11,951	$ 12,190	$ 12,434	$ 12,682	$ 12,936	$ 13,195
Insurance		$ 20,000	$ 20,400	$ 20,808	$ 21,224	$ 21,649	$ 22,082	$ 22,523	$ 22,974	$ 23,433	$ 23,902	$ 24,380	$ 24,867	$ 25,365	$ 25,872	$ 26,390
Total		$ 128,617	$ 130,754	$ 132,933	$ 135,157	$ 137,425	$ 139,738	$ 142,097	$ 144,504	$ 146,959	$ 149,463	$ 152,017	$ 154,622	$ 157,279	$ 159,989	$ 162,754
Net Income		$ 303,743	$ 304,207	$ 304,690	$ 305,194	$ 305,720	$ 306,269	$ 306,841	$ 307,437	$ 308,058	$ 308,705	$ 309,378	$ 310,080	$ 310,810	$ 311,570	$ 312,361
Debt Payments (Principal + Interest)		$ 255,939	$ 255,939	$ 255,939	$ 255,939	$ 255,939	$ 255,939	$ 255,939	$ 255,939	$ 255,939	$ 255,939	$ 255,939	$ 255,939	$ 255,939	$ 255,939	$ 255,939
Surplus Cash		$ 47,804	$ 48,267	$ 48,751	$ 49,255	$ 49,781	$ 50,330	$ 50,902	$ 51,498	$ 52,119	$ 52,765	$ 53,439	$ 54,141	$ 54,871	$ 55,631	$ 56,421
Debt Service Ratio (1.2 or greater)		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Debt Interest, %	3.7%															
Debt Term, Years	25															
Investment																
Preconstruction costs	$ 415,000															
Construction costs																
Anaerobic Digestion Facility	$ 2,945,504															
Renewable Energy System (0.1 MW)	$ 185,000															
Dewatering Systems	$ 222,000															
Grants	$ -															
Subtotal	$ 3,767,504															
Debt closing costs	$ 80,000															
Debt service reserve fund	$ 127,935															
Capitalized interest	$ 152,724															
Total	$ 4,128,163															

TABLE 5: PROJECT ECONOMICS: FAVORABLE CASE (100% DEBT FINANCED)																	
YEAR:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Revenues																	
Organic material disposal fee		$ 36,500	$ 37,595	$ 38,723	$ 39,885	$ 41,081	$ 42,314	$ 43,583	$ 44,890	$ 46,237	$ 47,624	$ 49,053	$ 50,525	$ 52,040	$ 53,601	$ 55,210
Greenfield sludge disposal fee		$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037	$ 292,037
Other WWTP sludge disposal fee		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Digestate solids sales		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Power (avoided cost) and RECs sales		$ 118,415	$ 121,484	$ 124,677	$ 127,997	$ 131,450	$ 135,040	$ 138,775	$ 142,659	$ 146,698	$ 150,899	$ 155,268	$ 159,812	$ 164,537	$ 169,451	$ 174,562
Total		$ 446,951	$ 451,116	$ 455,436	$ 459,918	$ 464,567	$ 469,390	$ 474,394	$ 479,586	$ 484,972	$ 490,560	$ 496,357	$ 502,373	$ 508,614	$ 515,089	$ 521,808
Expenses																	
Operations AD		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operations Power Plant		$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765
Supplies and Outside Services		$ 32,926	$ 33,585	$ 34,256	$ 34,941	$ 35,640	$ 36,353	$ 37,080	$ 37,822	$ 38,578	$ 39,350	$ 40,137	$ 40,939	$ 41,758	$ 42,593	$ 43,445
Repairs		$ 25,000	$ 25,500	$ 26,010	$ 26,530	$ 27,061	$ 27,602	$ 28,154	$ 28,717	$ 29,291	$ 29,877	$ 30,475	$ 31,084	$ 31,706	$ 32,340	$ 32,987
Residuals disposal		$ 18,926	$ 19,304	$ 19,691	$ 20,084	$ 20,486	$ 20,896	$ 21,314	$ 21,740	$ 22,175	$ 22,618	$ 23,071	$ 23,532	$ 24,003	$ 24,483	$ 24,972
Administration		$ 10,000	$ 10,200	$ 10,404	$ 10,612	$ 10,824	$ 11,041	$ 11,262	$ 11,487	$ 11,717	$ 11,951	$ 12,190	$ 12,434	$ 12,682	$ 12,936	$ 13,195
Insurance		$ 20,000	$ 20,400	$ 20,808	$ 21,224	$ 21,649	$ 22,082	$ 22,523	$ 22,974	$ 23,433	$ 23,902	$ 24,380	$ 24,867	$ 25,365	$ 25,872	$ 26,390
Total		$ 128,617	$ 130,754	$ 132,933	$ 135,157	$ 137,425	$ 139,738	$ 142,097	$ 144,504	$ 146,959	$ 149,463	$ 152,017	$ 154,622	$ 157,279	$ 159,989	$ 162,754
Net Income		$ 318,335	$ 320,362	$ 322,503	$ 324,761	$ 327,143	$ 329,653	$ 332,297	$ 335,082	$ 338,013	$ 341,097	$ 344,341	$ 347,751	$ 351,335	$ 355,100	$ 359,055
Debt Payments (Principal + Interest)		$ 189,417	$ 189,417	$ 189,417	$ 189,417	$ 189,417	$ 189,417	$ 189,417	$ 189,417	$ 189,417	$ 189,417	$ 189,417	$ 189,417	$ 189,417	$ 189,417	$ 189,417
Surplus Cash		$ 128,918	$ 130,945	$ 133,086	$ 135,344	$ 137,726	$ 140,236	$ 142,880	$ 145,665	$ 148,596	$ 151,680	$ 154,924	$ 158,334	$ 161,918	$ 165,683	$ 169,638
Debt Service Ratio (1.2 or greater)		1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9
Debt Interest, %	3.7%															
Debt Term, Years	25															
Investment																
Preconstruction costs	$ 415,000															
Construction costs																
Anaerobic Digestion Facility	$ 2,945,504															
Renewable Energy System (0.1 MW)	$ 185,000															
Dewatering Systems	$ 222,000															
Grants	$ (1,000,000)															
Subtotal	$ 2,767,504															
Debt closing costs	$ 80,000															
Debt service reserve fund	$ 94,681															
Capitalized interest	$ 113,009															
Total	$ 3,055,193															

TABLE 6: PROJECT ECONOMICS: UNFAVORABLE CASE (100% DEBT FINANCED)																	
YEAR:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Revenues																	
Organic material disposal fee		$ 25,550	$ 25,550	$ 25,550	$ 25,550	$ 25,550	$ 25,550	$ 25,550	$ 25,550	$ 25,550	$ 25,550	$ 25,550	$ 25,550	$ 25,550	$ 25,550	$ 25,550
Greenfield sludge disposal fee		$ 438,937	$ 445,521	$ 452,204	$ 458,987	$ 465,871	$ 472,859	$ 479,952	$ 487,152	$ 494,459	$ 501,876	$ 509,404	$ 517,045	$ 524,801	$ 532,673	$ 540,663
Other WWTP sludge disposal fee		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Digestate solids sales		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Power (avoided cost) and RECs sales		$ 102,348	$ 102,348	$ 102,348	$ 102,348	$ 102,348	$ 102,348	$ 102,348	$ 102,348	$ 102,348	$ 102,348	$ 102,348	$ 102,348	$ 102,348	$ 102,348	$ 102,348
Total		$ 566,834	$ 573,419	$ 580,101	$ 586,884	$ 593,769	$ 600,757	$ 607,850	$ 615,049	$ 622,357	$ 629,774	$ 637,302	$ 644,943	$ 652,698	$ 660,570	$ 668,561
Expenses																	
Operations AD		$ 56,025	$ 57,146	$ 58,288	$ 59,454	$ 60,643	$ 61,856	$ 63,093	$ 64,355	$ 65,642	$ 66,955	$ 68,294	$ 69,660	$ 71,053	$ 72,474	$ 73,924
Operations Power Plant		$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765	$ 21,765
Supplies and Outside Services		$ 32,926	$ 33,585	$ 34,256	$ 34,941	$ 35,640	$ 36,353	$ 37,080	$ 37,822	$ 38,578	$ 39,350	$ 40,137	$ 40,939	$ 41,758	$ 42,593	$ 43,445
Repairs		$ 25,000	$ 25,500	$ 26,010	$ 26,530	$ 27,061	$ 27,602	$ 28,154	$ 28,717	$ 29,291	$ 29,877	$ 30,475	$ 31,084	$ 31,706	$ 32,340	$ 32,987
Residuals disposal		$ 93,972	$ 95,851	$ 97,768	$ 99,723	$ 101,718	$ 103,752	$ 105,827	$ 107,944	$ 110,103	$ 112,305	$ 114,551	$ 116,842	$ 119,179	$ 121,562	$ 123,993
Administration		$ 10,000	$ 10,200	$ 10,404	$ 10,612	$ 10,824	$ 11,041	$ 11,262	$ 11,487	$ 11,717	$ 11,951	$ 12,190	$ 12,434	$ 12,682	$ 12,936	$ 13,195
Insurance		$ 20,000	$ 20,400	$ 20,808	$ 21,224	$ 21,649	$ 22,082	$ 22,523	$ 22,974	$ 23,433	$ 23,902	$ 24,380	$ 24,867	$ 25,365	$ 25,872	$ 26,390
Total		$ 259,687	$ 264,446	$ 269,299	$ 274,250	$ 279,300	$ 284,450	$ 289,704	$ 295,063	$ 300,529	$ 306,104	$ 311,791	$ 317,591	$ 323,508	$ 329,543	$ 335,698
Net Income		$ 307,147	$ 308,973	$ 310,802	$ 312,634	$ 314,470	$ 316,307	$ 318,146	$ 319,987	$ 321,828	$ 323,670	$ 325,511	$ 327,351	$ 329,191	$ 331,028	$ 332,862
Debt Payments (Principal + Interest)		$ 255,943	$ 255,943	$ 255,943	$ 255,943	$ 255,943	$ 255,943	$ 255,943	$ 255,943	$ 255,943	$ 255,943	$ 255,943	$ 255,943	$ 255,943	$ 255,943	$ 255,943
Surplus Cash		$ 51,205	$ 53,030	$ 54,859	$ 56,692	$ 58,527	$ 60,364	$ 62,203	$ 64,044	$ 65,885	$ 67,727	$ 69,568	$ 71,409	$ 73,248	$ 75,085	$ 76,919
Debt Service Ratio (1.2 or greater)		1.20	1.21	1.21	1.22	1.23	1.24	1.24	1.25	1.26	1.26	1.27	1.28	1.29	1.29	1.30
Debt Interest, %	3.7%															
Debt Term, Years	25															
Investment																
Preconstruction costs	$ 415,000															
Construction costs																
Anaerobic Digestion Facility	$ 2,945,504															
Renewable Energy System (0.1 MW)	$ 185,000															
Dewatering Systems	$ 222,000															
Grants	$ -															
Subtotal	$ 3,767,504															
Debt closing costs	$ 80,000															
Debt service reserve fund	$ 127,971															
Capitalized interest	$ 152,744															
Total	$ 4,128,219															

TABLE 7: INVESTMENT DETAILS AND BASIS			
A. PRECONSTRUCTION COSTS			
Design, engineering and procurement			$ 135,000
Permitting			$ 40,000
Electrical Interconnection			$ 50,000
Development management			$ 75,000
Legal			$ 40,000
Financing costs			$ 25,000
Contingency			$ 50,000
Total			**$ 415,000**
B. CONSTRUCTION COSTS			
Anaerobic Digester			
2 Digesters (100,000 gallons each) installed	200,000	gallons	$ 635,000
~~Feedstock, mixing tank, hydrolysis tank installed~~	-	gallons	
Digestate Storage installed with site work	40,000	gallons	$ 60,000
Feedstock receiving and storage tanks installed with site work	40,000	gallons	$ 60,000
Feedstock tanks mixing, screening, pumping equip, rolloff			$ 189,500
2 Rotamix, pumps, mixer systems			$ 97,660
Heat exchange equipment			$ 91,436
Site work (Excavation, fill, grade, tank install)			$ 220,000
Building (pumps, piping, heat exchange, controls, engine-gen set) 900 sf footprint @ $150/sf			$ 270,000
Laboratory and equipment			$ -
Tools and work area			$ 1,000
Back up heat			$ 10,000
Mechanical			$ 442,350
Electrical			$ 261,000
Construction management			$ 200,000
Backup Generator			
Instrumentation and SCADA System			$ 70,000
Misc valves, instrument, valves			$ 87,558
Contingency			$ 250,000
			$ 2,945,504
Dewatering System			
Digestate solids separation, polymer feed, and ancillaries			$ 198,000
Building (Included above)			$ -
Site work (Included above)			$ -
Solids storage - roll-off 2 @ $5,500/Unit			$ 11,000
Contingency			$ 13,000
Total			**$ 222,000**
Renewable Energy System			
1 engine-generator set, sound attenuation radiator, switchgear		100	$ 100,000
motor controls, interconnect $1000/kW (building included above)			
Heat recovery equipment, pumps, and ancillaries			$ 30,000
Flare			$ 40,000
Contingency			$ 15,000
Total			**$ 185,000**
C. GRANTS			-
D. BOND FINANCING COSTS			
Debt closing costs			80,000
Debt service reserve fund (6-months)			127,935
Capitalized interest (1-year)			152,724
Total			**360,659**
Debt financing	$ 4,128,163		
Term (years)	25		
Rate	3.7%		
Year in service	2020		

TOTAL INVESTMENT (A + B + C + D)			**4,128,163**

CommonWealth
Resource Management
Corporation

December 7, 2018

Mark Holley
Water/Wastewater
Superintendent Town of
Greenfield
14 Court Square
Greenfield, MA 01301

RE: Conceptual design and preliminary economics of an anaerobic digestion project at the Town of Greenfield Waste Water Treatment Facility

Dear Mr. Holley,

CommonWealth Resource Management Corporation (CRMC) is pleased to provide this letter report to the Town of Greenfield (herein the "Client") to provide a conceptual level design and preliminary economics of a moderately sized anaerobic digestion and biogas-to-energy facility (the Project) at the Greenfield Waste Water Treatment Plant (Greenfield WWTP).

The Client and surrounding communities are concerned with (1) rising costs of transportation and disposal of sludges generated from their waste water treatment plants (WWTPs), and (2) increasingly restrictive requirements and limited capacity for accepting WWTP sludges at disposal facilities serving the New England region. The Client is interested in addressing these concerns by hosting the Project with the primary objective of aggregating sludges from nearby WWTPs at a facility with sufficient scale to reduce the sludge volume that requires disposal on an economic basis. The Client proposes to host the Project at the existing Greenfield WWTP. Residuals (spent digestate) from the Project would be dewatered on-site and the liquid portion returned to the headworks of the Greenfield WWTP, and the solids portion would be transported to a local compost facility, or other appropriate facilities for end-use or disposal.

To meet the Client objectives, the Project would modify the existing operation, site and infrastructure at the Greenfield WWTP by adding equipment and facilities to

1. Accept liquid sludge from the Greenfield WWTP and other area WWTPs into an anaerobic digestion (AD) facility.
2. Operate the AD facility in order to generate bio-gas and reduce the volume of liquids requiring off-site disposal.

3. Accept pumpable source-separated organic material (e.g. FOG and slurried food waste) to supplement the WWTP sludges as a feedstock for the AD facility, thereby generating
   (1) additional tipping fee revenues for the Project, and (2) higher levels of bio-gas.
4. Use the bio-gas to fuel an engine-generator to serve the electric and thermal loads of the Project and the electric load of the Greenfield WWTP.
5. Construct and operate the Project on a basis that revenues from disposal fees, renewable energy credits and avoided energy costs exceed operating costs and debt service, and the surplus together with the savings from avoided sludge transportation and disposal costs provides a reasonable payback on the capital investment in the Project.

The remainder of this letter report describes the existing infrastructure and operations of the Greenfield WWTP, suggests Project components, size, conceptual design and performance to meet the Client's objective, and assesses the economics of the Project on a preliminary basis to determine if and under what conditions the Project would be commercially viable. CRMC based much of this preliminary assessment on direct experience with the development, construction and operation of an AD facility of similar size and design that was developed by CRMC and is owned and operated by a CRMC affiliate (the CRMC Bioenergy Facility located in Dartmouth Massachusetts). CRMC also utilized information learned from other projects of similar design and scale in the course of designing, developing, constructing, and operating its facility, including information from the design, construction and operation of a comparable project at the City of Flint (Michigan) Water Pollution Control Facility.

The Greenfield WWTP

Client owns and operates the Greenfield WWTP at 384 Deerfield Street in Greenfield, Massachusetts. The Greenfield WWTP is designed to treat up to 4.5 million gallons per day of waste water that is generated by the sewer system serving the Town of Greenfield. The Greenfield WWTP has a permit[1] with a daily limit for effluent discharge of 3.4 million gallons per day (on a monthly average basis). Sewage in-flows to the Greenfield WWTP are typically below 3.4 million gallons per day, but this level has been exceeded during months of higher than normal precipitation. Greenfield is in the process of acting to reduce its overall inflows by identifying the potential problems and assessing repairs associated with inflows and infiltration to the existing sewer collection system.

As shown in Figure 1, the Greenfield WWTP uses mechanical, biological and chemical processes to treated wastewater for discharge to the Deerfield River, and to separate thickened sludge for transport off-site for disposal. The process steps include screening, primary settlement of solids, aeration over two over-sized trickling filters in series with a recirculation loop, final clarification, sludge thickening prior to removal of sludge for off-site disposal, and disinfection of the water by chlorination, and further dichlorination of the treated water prior to discharge to the Deerfield River. The thickened sludge is exported to Lowell, Massachusetts for disposal. The operation produces approximately 5,700 gallons per day of thickened sludge for export, which includes primary sludge generated from the primary sedimentation tanks and secondary sludge generated from secondary clarifiers. The combined primary and secondary sludge contain four to eight percent solids

comprised of 65- to 75-percent volatile organic

[1] Authorization to Discharge under the National Pollutant Discharge Elimination System, NPDES #: MA0101214, September 28, 2011 issued by United States Environmental Protection Agency and Massachusetts Department of Environmental Protection.

material. The sludge is pumped to and stored in a nine-thousand-gallon tanker truck. The sludge is pumped into liquid waste hauling trucks daily, four-days per week, for transport to the Lowell WWTP for disposal.

The Client and surrounding WWTPs currently transport and dispose of approximately 7.4 million gallons per year of sludge (30,400 wet tons or 1,000 dry tons per year) at a cost of $1.2 million. The Client alone is facing a cost of $480,000 for fiscal year 2019 to transport and disposal of its 2.1 million gallons per year of sludge at an average solids content of 5 percent. The Client currently pays $1,126 per dry ton of sludge for transport and disposal ($0.23 per gallon) including $880 per dry ton ($0.18 per gallon) for disposal and $246 per dry ton ($0.05 per gallon) for transport. Costs had averaged $260,000 per year over the prior two years, so the current costs represent an increase of $220,00 per year, or 85 percent, over the prior average annual cost. These costs represent 30-percent of the total $1.4 million annual operating budget for the Greenfield WWTP. The Client believes that these costs may continue to increase as capacity for sludge disposal in the region declines. Because of the scarcity of disposal capacity, not only is the price for disposal of sludge increasing, but the disposal facilities are imposing increasingly more stringent requirements on the Greenfield WWTP and other area WWTPs for delivered sludge. As a consequence, liquid waste haulers have to travel to more distant disposal facilities to find capacity, thereby increasing transportation costs.

Other WWTPs in the area face a cost of $734,000 for fiscal year 2019 to transport and disposal of its 5.3 million gallons per year of sludge at an average solids content of 2.6 percent.
Other WWTPs in the area are currently paying $1,280 per dry ton ($0.14 per wet gallon) of sludge for transport and disposal, including $730 per dry ton ($0.08 per gallon) of sludge for disposal and $550 per dry ton ($0.06 per gallon) for transport

The Greenfield WWTP also receives small quantities of septic waste in two 2,000-gallon underground storage tanks. The septic waste passes through a Raptor screening system to filter out solid trash. The filtered septic waste is pumped to the headworks of the Greenfield WWTP for treatment.

The Greenfield WWTP has an average 24-hour per day electric power load of 127 kW, which load is served by Eversource. If Eversource is unable to deliver electricity to the Client for any reason, the Client has a back-up diesel generator rated at 500 kW, which provides enough capacity to manage the entire Greenfield WWTP load. The Greenfield WWTP pays approximately $180,000 annual in electricity costs of which $130,000 is commodity energy and per-kWh costs that might be avoided if electricity were generated behind the meter.

Client anticipates that limits on nitrogen compounds and phosphorus contained in the discharged effluent may be imposed in a new permit issued by the regulating entities in the future. The Client is considering options for addressing these potential limits. The Client

has evaluated optimization methods designed to maintain nutrient loads. The Client prepares and submits monthly reports to regulators on the nutrient levels in the effluent.

The Project

The Client is interested in establishing the conceptual design of the Project to be located at available space within the site of the Greenfield WWTP. Project operations would be integrated within the existing operations of the Greenfield WWTP. To meet the Client's objectives stated previously, the Project would provide capacity to manage sludge from the Greenfield WWTP and other WWTPs in the area, would provide a modest quantity of disposal capacity for pumpable source-separated organic material such as septic waste, fats, oils and grease (FOG), and slurried food waste, and would generate sufficient quantities of biogas to be used to generate electricity and heat for use internally by the Project and by the Greenfield WWTP.

The Project would accept and process sludge that is generated from WWTPs located in several communities in the region including the Towns of Greenfield, Montague, Old Deerfield, South Deerfield, Hadley, Sunderland, Ashland, Northfield and Hatfield. These communities have each expressed interest in cooperating in the development and use of the Project.

The WWTPs in these communities generate an average of 616,000 gallons per month or 20,000 gallons per day, of sludge at annual averages of two- to five-percent solids content as shown below in Table 1.

Table 1: Sludge Generation Rates by WWTP

	Sludge generated					
	Gallons	Gallons	Gallons	Gallons		Dry tons
Town	per year	per month	per day (7-day)	per day (5-day)	% solids	per year
Greenfield	2,086,000	173,833	5,715	8,001	4.97%	425
Montague	2,340,000	195,000	6,411	8,975	2.50%	244
Old Deerfield	180,000	15,000	493	690	3.00%	22
S. Deerfield	772,800	64,400	2,117	2,964	2.98%	94
Hadley	1,200,000	100,000	3,288	4,603	2.50%	125
Sunderland	359,921	29,993	986	1,381	2.35%	35
Ashland	59,501	4,958	163	228	2.10%	5
Northfield	18,000	1,500	49	69	4.50%	3
Hatfield	372,000	31,000	1,019	1,427	2.80%	43
Total	7,388,222	615,685	20,242	28,338	3.29%	998
Low			18,218	25,505		
Peak			24,290	34,006		

With the Client's objective for sizing and service, CRMC prepared the conceptual design with the following design objectives and performance criteria:

- Efficient use of site. Utilize the available site area efficiently by placing the components and systems in a logical functional sequence to efficiently move materials, thermal energy and power through the system.

- Process design and performance. Support the operating conditions under which the various biological processes that result in stable and accelerated generation of biogas and the stabilization of the digestate are sustained, namely: (a) the breakdown of complex organics such as carbohydrates, proteins, and lipids to water soluble organics such as glucose, amino acids and fatty acids; (b) the further breakdown of water soluble organics to organic acids; and (c) the conversion of organic acids to methane and carbon dioxide.

- Equipment selection. Select equipment that is widely available, reliable, durable, repairable and readily replaceable. All system functions, including sludge and other organic feedstock receiving, pre-treatment and storage; pre-treated feedstock mixing and conditioning; hydraulic circulation and re-circulation within and outside of the digester; biogas collection and transmission; and spent digestate dewatering and discharge, are all to occur within an engineered configuration of commercially available tanks, pumps, piping, and related materials-processing and control equipment used throughout the wastewater treatment, food processing, chemical manufacturing and other industries.

- Reliability. Integrate equipment in a design that is simple and provides operational flexibility and redundancy. To the extent feasible, place process equipment outside of tanks to make maintenance of the equipment readily accessible and serviceable.

- Provide for options. Provide ability to add options to increase capacity of the Project and remove nitrogen and phosphorus from dewatered filtrate to be returned to the headworks of the Greenfield WWTP.

The remainder of this letter describes the Project and how the Project would be sited on available land at the Greenfield WWTP and integrated with the Greenfield WWTP.

The Project Site Layout

Client indicated that available land for the Project is located north of the existing disinfection building as shown in Figure 2 – Site Layout. This area comprises a total of approximately 15,000 square feet. This land is conveniently located adjacent to the two septic receiving area tanks and near the 9,000-gallon sludge loadout tank. The land is surrounded by existing roadway for ease of truck access. The Project would require the use of the entire 15,000 square feet of land available. The New Feedstock Storage System would be placed along the northern portion of the area. The four tanks, including the Mixing and Feedstock Storage Tank, two Anaerobic Digesters, and Spent Digestate Tank would be placed at corners of the rectangular site. A building with a footprint of 1,800 square foot would be constructed between the four tanks using the four tanks as a portion of the outside wall. The building would consist of two levels providing 3,600 square feet of usable space. The lower level would be built up to the highest flood level and would contain all piping connections and valves between tanks and process equipment. The

upper level would be built above the highest flood level and would contain the Dewatering System, the Renewable Energy System, and piping and pumping equipment. Interconnections to the Greenfield WWTP would include piping to the sludge pump out area, piping from the Dewatering System to the headworks of the Greenfield WWTP, and electric power to the 480-volt interconnection point to serve on-site loads only.

Client indicates that a second area located east of the existing disinfection building is also available for the Project as shown in Figure 3 – Alternative Site Layout. To fit the narrower area of the second location, the New Feedstock Storage Area, building and tanks would be lined up sequentially.

The Project Components

The Project would be comprised of facilities to receive WWTP sludge generated on-site, WWTP sludge generated by other area WWTPs, septic waste received on-site in two 2,000-gallons tanks, and possibly source-separated organic material (e.g. fats, oils and grease) in pumpable form that is generated by off-site sources. The Project would convert these materials into biogas, renewable electricity, thermal energy, and residual products including liquids and solids. The liquids would be returned to the Greenfield WWTP headworks. Solids would either be taken to the Montague compost facility or soil aggregators that would use the solids as an amendment to soil products or other appropriate facilities for disposal. The biogas, renewable electricity, and thermal energy would be used to meet Project electric and thermal loads and some portion of the Greenfield WWTP electric loads.

The Project is sized to create enough capacity to accept and process (1) the entire 20,000 gallons per day of existing sludge generated by the Greenfield WWTP and by the multiple WWTPs located in several communities in the region including the Towns of Greenfield, Montague, Old Deerfield, South Deerfield, Hadley, Sunderland, Ashland, Northfield and Hatfield. The Project is also sized to accept 2,500 gallons per day of addition of source-separated organic material generated by off-site sources. The Project is further sized to use the feedstocks to produce biogas quantities sufficient to generate approximately 200 kW of electric power and 0.8 MMBtu per hour of recovered thermal energy from a small gas engine-generator. This level of electric power and heat production would meet the Project electric and thermal loads and some portion of the Greenfield WWTP electric loads. The Project electric loads are estimated to be 80 kW. The Greenfield WWTP has an average electric load of 127 kW.

The new facilities that would comprise the Project include (1) a 30,000-gallon-underground tank for receipt, screening, mixing and storage of feedstocks, (2) a 200,000-gallon mixing tank to receive, store, condition and mix sludge, septic waste, other source-separated organics materials and any other inoculants or chemicals, (3) two 200,000-gallon anaerobic digesters to provide a total of 400,000 gallons of capacity, (4) a 200,000 gallon digestate storage tank, (5) a dewatering system, and (6) a renewable energy power and thermal production system (the engine-generator set and auxiliary equipment), all as shown in Figure 4 – Project General Arrangement. The Project would operate continuously. Facility access for deliveries and export of materials would occur on a five (5) days per week operating schedule (8 hours per weekday) consistent with the existing operating schedule of the Greenfield WWTP.

Figure 4 shows the general arrangement of the Project. Figure 5 is a Process Flow Diagram that shows the sequence of material and energy flow through the Project. Figure 5 -- labeled with letters A through J -- correspond to the order of the descriptions of the individual Project components. Figure 6 is a Mass Balance that shows the quantities of material flows and power production through the process. Table 2 summarizes the dimensions of the systems and equipment described below.

As shown in Figure 5, the Project incorporates the following systems and functions:

- (A) Existing On-site Feedstock Storage System. All sludge generated by the Greenfield WWTP would continue to be stored in the existing 40,000-gallon tank to be thickened. Thickened sludge would be transferred to an existing 9,000-gallon load-out tank or directly transferred to the Feedstock Receiving/Screening System.

- (B) Existing Off-site Feedstock Storage System. All sludge would continue to be stored in 210,000 gallons of off-site storage that is associated with the eight other WWTPs potentially participating in the surrounding area. Thickened sludge would be transferred from the participating WWTP in 9,000-gallon liquid hauling trucks for delivery to the Feedstock Receiving/Screening System.

- (C) Existing Septic Waste Storage and Screening System. All septic waste would continue to be received in two 2,000-gallon underground storage tanks. The septic waste is passed through a Raptor screen to remove trash from the septic waste. After screening, septic waste would be transferred to the Feedstock Receiving/Screening System.

- (D) Feedstock Receiving/Screening System. Receipt of pumpable sludges and other organic wastes delivered by tanker vehicles would take place at a cement-paved and partially-covered delivery location. The feedstocks would be received, and gravity-fed into underground storage tanks with the capacity of 40,000 gallons. Receipt of thicken sludge from the Greenfield WWTP would be delivered by pipe directly into the underground storage tanks. All pumpable feedstocks that would be received would be screened for removal of tramp materials and then stored in the 40,000-gallon underground storage tanks. The storage tank would contain mechanical or hydraulic mixing equipment, pump and automated screen.

- (E) Mixing and Feedstock Storage Tank. An above-ground insulated 200,000-gallon tank would receive materials pumped from the New Feedstock Storage Tanks (D) for storage and further conditioning of these materials prior to their introduction into the Anaerobic Digesters (D). The feedstock in this tank would be continuously mixed and heated to a temperature of 98 degrees F or less prior to injection into the AD. The continuous mixing would occur through the action of a hydraulic mixing system that uses high-pressure floor- and wall-mounted nozzles to create a cyclonic swirl within the tank. The pump and heating equipment would be external to the tank to make maintenance of the equipment readily accessible and serviceable

If required, additives may be added to the mixing tank to (1) adjust alkalinity and pH, (2) enhance the microbial activity, (3) control hydrogen sulfide formation, and (4) precipitate phosphorus. During the mixing and heating, the initial stage of hydrolysis would commence. Bacteria already present in the sludge and other organic waste would start to transform the particulate organic substrate into liquefied monomers and polymers. More simply, complex organic compounds are broken down into simple organics (e.g. proteins, carbohydrates and fats are transformed to amino acids, monosaccharides and fatty acids respectively). Biogas may be generated during the hydrolysis. The biogas would be drawn from the tank via valved outlets at the top of the tank, which would be outfitted with emergency pressure release valves. The tank would stand 34-feet in diameter and would rise 33-feet above grade.

The Mixing and Feedstock Storage Tank would have the same size, design and performance as each of the two Anaerobic Digesters, and therefore would be able to be used as an anaerobic digester should one of the AD units be out of operation for any reason.

- (F) The Anaerobic Digesters would convert organic material into a biogas that can be used to generate energy. Two insulated 200,000-gallon glass-fused metal tanks would receive mixed and heated feedstock from the Mixing and Feedstock Storage Tank (E) at a rate of approximately 22,000 gallons per day including approximately 20,000 gallons per day of sludge and septic waste, and 2,000 gallons of other liquid organic material. The material in this tank (referred to as “digestate”) would undergo a process of continuous feed, wet, mesophilic anaerobic digestion that would support the balance of microbial populations required to efficiently convert organic materials into biogas and stabilized digestate. The contents of the Anaerobic Digesters would be heated using thermal energy produced by the Renewable Energy Plant (F) to maintain a temperature 98 degrees Fahrenheit and would be continuously mixed internally for a residence time of approximately 20 days. The continuous mixing would occur through the action of a hydraulic mixing system that uses high-pressure floor- and wall-mounted nozzles to create a cyclonic swirl within the tank. The pump and heating equipment would be external to the tank to make maintenance of the equipment readily accessible and serviceable

  Together, the Digesters are expected to produce biogas at a heating value rate of approximately 2.2 million Btus (“MMBtu”) per hour. Biogas would be drawn from the Digesters via valved outlets at the top of the tanks, which would be outfitted with emergency pressure release valves. The biogas would be piped to the Renewable Energy Plant (F) to produce renewable electricity and thermal energy. Approximately 22,000 gallons per day of stabilized digestate would also be produced by the Digester and would be pumped to the Dewatering System (G) to make a solids product. The Anaerobic Digesters would each stand 34-feet in diameter and would rise 33 feet above grade.

  The advantages of using two 200,000-gallon Digesters in place of a single 400,000-gallon digester include: (a) providing for continued processing capacity in the event of equipment malfunctions or the collapse of the microbial communities within a

Digester; and (b) enabling one digester to reseed the malfunctioned digester and thereby returning it back to operating.

- (G) The Spent Digestate Storage Tank, with a capacity of 200,000 gallons, would receive and temporarily store stabilized digestate from the Anaerobic Digesters (F). The Digestate Storage Tank would be the same size as the Anaerobic Digesters and would have the same heating and mixing capability as the other three tanks. Subsequently, the stabilized digestate temporarily stored in this tank would be pumped downstream to the Dewatering System (G) for further processing. Biogas would still be generated albeit at a lower rate than the Digesters. The biogas would be drawn from the Spent Digestate Storage Tank via valved outlets at the top of the tank, which would be outfitted with emergency pressure release valves. The tank would stand 34-feet in diameter and would rise 33-feet above grade.

  A process building with an approximate rectangular footprint of 1,800 square feet would be located within the middle of the four identically sized tanks; the Mixing and Feedstock Storage Tanks, the Digesters, and the Spent Digestate Storage Tank. The four tanks would be located at the corners of the rectangular building. The process building would be comprised of two levels. The first level would be dedicated to valves and piping that connect the tanks and process equipment. Should a flood event occur at the Greenfield WWTP, the first floor would not contain equipment that could become damaged from infiltration of flood waters. The second level would be dedicated to the process equipment and systems including the Renewable Energy System, the Dewatering System, tools and spare parts area, and monitoring and control system for the Project. The second level would be constructed above the high flood level mark to protect the process equipment from a flooding event.

- (H) The Renewable Energy System would consist of an engine-generator set housed in an area of 560 square feet in the 1,800 square foot second level area of the building to produce renewable energy, including up to 200 Kilowatts (“kW”) of power and 0.8 MMBtu per hour of recovered thermal energy using the biogas fuel produced in the Anaerobic Digesters (D).

  The thermal energy would be recovered on-site to provide space heating and process heat for all operations at the Project. The thermal energy would be recovered from the jacket water that maintains the temperature of the engine, and a waste heat recovery unit on the exhaust gas. Recovered thermal energy would be used to heat the Mixing and Feedstock Storage Tank, the Anaerobic Digesters, the cement paved receiving area, and the building space. The large thermal loads would include 0.045 MMBtu per hour to heat the feedstock from 50 degrees to 98 degrees F, and 0.17 MMBtu per hour to maintain temperature of the Mixing Tank and the Digesters at 98 degrees F with an ambient temperature at -10 degrees
  F. Additional thermal loads would include heating the interior of the building and the concrete pad overlying the receiving area.

The 200 kW of power would be used for on-site power uses of the Project (approximately 80 kW) and a portion of the on-site power requirements of the WWTP (approximately 127 kW). Combustion air required by the engine generator at the Renewable Energy Plant would be extracted from the Project buildings and tankage to control potential odors that may be associated with Project operations.

- (I) The Dewatering System would consist of dewatering equipment housed in an area of 300 square feet in the second level area of the building to separate the solids and water fractions of the digestate generated through anaerobic digestion. The resulting water would be pumped to the headworks of the Greenfield WWTP, and the solid fraction would be stored in roll-off containers for transport to an off-site composting process, a soils manufacturer or disposal facility. The processing would be performed entirely within this enclosed building and would produce approximately 7.4 wet tons at 25% solids content or
  1.9 dry tons of solid product per day.

  The digestion process would provide biosolids that would meet Class B biosolids standards under the USEPA 40 CFR Part 503 regulations. Specifically, anaerobic digestion is a process identified under 40 CFR Part 503 regulations to produce Class B biosolids but must maintain the mean cell residence time and temperature between 15 days at 95-degrees F to 60 days at 68-degrees F. The Spent Digestate Storage Tank could be heated to 122 degrees or above for at least 30-minutes to further reduce pathogens to attain a Class A biosolids.

- (J) Environmental Controls: To prevent the potential for fugitive odors, all receiving and storage of organic feedstocks and digestate would be accomplished within enclosed tanks, and associated piping. The air from the building and process tankage would be vented to the Renewable Energy Plant (H) to be used as combustion air in the engine-generators. The combustion would destroy any contaminants in the air that might be odorous. When the Renewable Energy System is unavailable for any reason to combust biogas, a flare would be available to combust the biogas and vented air.

The Project Operations

The Project would use two feedstocks including sludge that is currently generated by the Greenfield WWTP and other area WWTPs, and pumpable source-separated organic material from offsite sources delivered to the Project. On-site, the sludge would continue to be generated from the existing sludge thickener and stored in the one existing 9,000-gallon storage tank. Sludge would be conveyed either from the 9,000-gallon storage tank or the existing sludge thicker to the New Feedstock Storage System or the Mixing and Feedstock Storage Tank.

The Project would separately receive sludge, septic waste and other source-separated organic materials. Each of these materials would be delivered to the site in pumpable liquid form by tanker truck. The pumpable source-separated organic material would be gravity fed into new underground 40,000-gallon storage tanks. Tanker trucks with up to 9,000 gallons

of capacity would be accepted for delivery. The feedstock would be mixed in the storage tanks using mechanical mixers. Contaminants in the feedstock would be removed by automatic screening equipment and the trash contents stored in a roll-off for transport and disposal.

Daily up to 20,000 gallons of sludge, and approximately 2,500 gallons of pumpable source- separated organic material would be pumped into the 200,000-gallon Mixing and Feedstock Storage Tank. This tank would incorporate a mechanical hydraulic mixing and heating circuit that would keep the materials thoroughly mixed within the tank and heated. A small chemical feed system would be used to inject any additives into the Mixing and Feedstock Storage Tank. The contents of the tank would be continuously and slowly fed into each of the two 200,000- gallon Anaerobic Digesters. The Anaerobic Digesters would be continuously hydraulically mixed and heated as needed to maintain a uniform temperature of approximately 98 degrees Fahrenheit.

Biogas would be extracted from the top gas volume at the top of the Mixing and Feedstock Storage Tank, Anaerobic Digesters and Spent Digestate Tank to maintain a positive pressure of approximately 6 inches of water gauge in each tank. The biogas would be extracted by a centrifugal blower at a rate that would maintain the positive pressure level in the tanks and deliver the biogas to an engine-generator sized to generate up to 200 kW of electric power.

From the Anaerobic Digesters, spent digestate would be extracted continuously from the Anaerobic Digesters through an overflow pipe that would maintain the liquid level in the Anaerobic Digesters. Approximately 22,000 gallons of spent digestate would be extracted from the Anaerobic Digesters each day and conveyed to the Spent Digestate Storage Tank with the capacity of 200,000 gallons.

The spent digestate would be extracted from the Spent Digestate Storage Tank and conveyed to the Dewatering System. Polymer would be added to the digestate at a rate of 12 pounds per dry ton of solids. The polymer-treated digestate would pass through a centrifuge to separate the liquid from the solids with a processing rate of 6,000 gallons per hour. 95-percent of the solids would be captured in the solids phase resulting in a solid content of 25-percent in 7.4 wet tons per day or 1.9 dry tons per day. The solids would be stored in a roll-off container and either hauled to a nearby compost processing system, or other end-user or disposal facility. The liquid phase (filtrate) would be approximately 20,000 gallons per day containing less than 0.1-percent solids content. The liquid phase would be disposed at the headworks of the WWTP.

The Project Options

The Client has the option to add process equipment to the Project in order to (1) increase the processing capacity of the Project, (2) accept more high organic content waste to increase biogas production, and (3) treat the dewatered spent digestate for removal of nitrogen and phosphorus before returning filtrate to the Greenfield WWTP headworks.

Increase the processing capacity of the Project. The process capacity of the Project could be increased by concentrating or thickening the sludge that is received. The total solids concentration of the sludges average 3.3 percent and ranges from 2 percent to 5 percent, which are relatively low concentrations. Concentrating the sludge would reduce the mass flow of feedstock through the system, thereby increasing the available capacity. To concentrate the sludge, the Client could either

1. Work with other WWTPs that would provide sludge to the Project to optimize their existing operations or add process equipment to increase their solids content. Currently the WWTP facilities in the area pay a higher disposal cost for higher solids content in sludge. If no cost differential was present at the Project for more concentrated sludge, the area WWTPs would have an economic incentive to increase the solids content of the sludge thereby reducing the sludge quantities required to be transferred for disposal at the Project.

2. Add process equipment at the start of the Project to concentration the received sludge. To thicken incoming wastewater sludges, additional capital would be required to install and operate a sludge thickener and ancillary support equipment. Applicable technologies for thickening the sludges would either be a gravity belt or rotary drum thickener. For either unit, the following ancillary equipment would be required.
    - Sludge feed pump
    - Thickened sludge pump
    - Polymer mixing and delivery system
    - Filtrate return pump and well (if gravity drainage to the headworks is not available)
    - System controls and automation
    - Odor/Off gas removal

    Operation of a rotary drum or gravity belt thickener would require additional labor to start and stop the unit, adjust polymer dosing, and monitor and control sludge feed rates. Once the appropriate ratio of polymer to feed sludge are set to obtain the desired sludge concentration, periodic inspections of the unit and its performance across the work period would be required. After the completion of daily operations, labor would be required to clean, inspect and maintain the equipment until its next use.

    A gravity belt or rotary drum thickener would require approximately 400 square feet area (20-foot by 20-foot) to provide enough space for the thickener (6-feet by 8-feet), its ancillary equipment and room to operate and service the equipment. The process equipment in the building could be configured to provide sufficient room for a thickener operation.

    A sludge thickener can capture 95 percent of solids and thicken the concentrated stream up to 9-percent solids. The resulting flows of filtrate and thickened sludge are shown in Table 3 below.

Table 3: Sludge Thickener Performance

Parameter	Flow, gallons/day	Solids, %
Feedstock	20,000	3.3%
Filtrate	13,005	0.3%
Thickened Sludge	6,995	9.0%

The filtrate would be conveyed to the WWTP headworks for treatment, and the thickened sludge to the Feedstock Receiving/Screening System or Mixing and Feedstock Storage Tank.

The thickener would allow Client to increase WWTP sludge received at an average of 3.3-percent solids by 13,000 gallons per day.

Accept more high organic content waste to increase biogas production,

The Client could accept high organic-content waste such as slurried FOG, food waste or other organic waste streams to increase the production of biogas. At the 20,000 gallons per day of sludge throughput at an average of 3.3-percent solids, the Project would require adding approximately 2,500 gallons per day of high organic material (e.g. FOG or food waste slurry) to produce enough biogas for the Renewable Energy Power System to generate 200 kW of electricity. Increasing high organic content waste beyond this level would make more biogas than could be used at full capacity by the 200-kW engine-generator set. Under these conditions, the flare would be used to combust excess biogas. The Client would also have the option of adding more electric generating capacity and export excess electricity to the grid (which would add complexity, time and cost to the project development process to complete the interconnection studies that would be required). The Project could likely process up to 5,000 gallons per day of high organic waste together with 20,000 gallons per day of sludge and maintain a reasonable organic loading rate in the Anaerobic Digesters. The addition of high organic waste to the Project would increase the overall nutrient loading in the digestate and filtrate after dewatering.

Treat the dewatered spent digestate for removal of nitrogen and phosphorus before returning filtrate to the WWTP headworks

The filtrate from dewatered spent digestate will have elevated levels of nitrogen and phosphorus from the digestion process of sludges and/or other organic feed stocks. The filtrate could be further treated to remove nitrogen and phosphorus as discussed below. Table 4 shows the expected ranges of the filtrate from dewatered spend digestate and filtrate that is further treated to remove nitrogen and phosphorus.

Table 4: Characteristics of Filtrate from Dewatered Spent Digestate and Treated Filtrate		
Nutrient	Filtrate	Treated Filtrate
NH_3 - N	800 to 1000 mg/l (134 to 167 lb/day @ 20,000 gpd)	80 to 100 mg/l (13 to 17 lb/day @ 20,000 gpd)
PO_4^{3-} - P	15 to 20 mg/l (2.5 to 3.3 lb/day @ 20,000 gpd)	0.8 to 1.0 mg/L (0.13 to 0.17 lb/day @ 20,000 gpd)

Nitrogen contained within the sludges, in the form of proteins, would be converted in the digestion process to ammonia (NH_3). A large portion of the ammonia load would remain in the filtrate after the spent digestate is dewatered. CRMC understands that the Greenfield WWTP has a substantially oversized high rate trickling filter that provides the conditions for (1) removal of a portion of the ammonia contained in waste water through air stripping and (2) biological nitrification that oxidize a high portion of the remaining ammonia to nitrite and nitrate resulting in a nitrified effluent. The Greenfield WWTP does not have a subsequent denitrification process to reduce the nitrate and nitrites to nitrogen gas for release to the atmosphere.

One option to lessen the burden on the Greenfield WWTP of high nitrogen filtrate is to equalize the filtrate flows over the week (24 hours per day, 7 days per week) to reduce peak loading of ammonia to the headworks of the plant.

If the Greenfield WWTP is unable to accept the levels of nitrogen contained in the filtrate at its headworks, removal of the additional ammonia load could include adding side stream treatment technology such as anaerobic ammonium oxidization (Anammox) process to the Project, which process biologically converts ammonia to nitrogen gas and water. This process can effectively reduce ammonia by 90 percent.

Phosphorus is contained in filtrate from the phosphorus contained in the feedstocks. Removal of phosphorus can be accomplished by adding ferric chloride to the Mixing and Feedstock Storage Tank and the Digesters. The ferric chloride would react with phosphorus to form a solid precipitate, ferric phosphate. Ferric phosphate would be removed in the solids as part of the dewatering process of the spent digestate and be managed as part of the solid residuals. The ferric chloride would have the added benefit of precipitating sulfur compounds in the digesters that would reduce the potential for hydrogen sulfide production in the biogas.

The Project Performance versus Client Objectives

On a preliminary basis, it appears that, under the stated conditions, the performance of the Project could achieve the objectives stated by the Client. Specifically,

1. The Greenfield WWTP has sufficient space in two separate locations on-site to host a Project sized to manage the sludge generated by Greenfield WWTP and other area WWTPs. Note that because the site is largely in a flood plain, the construction of the Project on the site would likely require the Client to provide equal volume of storage to replace the loss of flood storage (e.g. compensatory storage).

2. The Project would reduce the volume of sludge from the WWTPs requiring disposal. As shown in Figure 6, the Mass Balance, the Project would reduce the volume of sludge from approximately 7.4 million gallons per year to 0.7 million gallons (2,710 wet tons or 680 dry tons) tons of residue from dewatered digestate requiring off-site delivery to either an end-user or to a disposal facility. The Project would convey the residue to an end user at no cost but in the worst case transported for disposal at a cost of $271,000 per year (transport and disposal of $100 per wet ton). The Project would also generate residue screened from incoming organic material at a rate of 192 tons per year requiring a cost of $19,200 for disposal. The Project would provide the Client with long-term control of its sludge disposal and likely provide substantial savings compared to current conditions as shown in the project economics below.

3. The Project could accept source-separated organic material to supplement the sludge as a feedstock to generate higher levels of biogas and added revenues. The source-separated organic material would increase the power production from 100 kW (sludge only) to approximately 200 kW (sludge + organic material). The organic material would increase revenues from disposal fees of approximately $82,000 annually ($0.10 per gallon * 821,000 gallons per year). Power generation at the 200-kW level would provide sufficient electricity to meet the power needs of the Project and most of the remaining power needs of the Greenfield WWTP.

4. The Project could produce biogas in sufficient quantities to fuel an engine-generator to serve the load of the Project and a portion of load of the WWTP. Specifically, the biogas generated from the anaerobic digestion of sludge and other organic material is estimated to support 200 kW of electric power output. The 200 kW would power the incremental in-plant power of 80 kW required to operate the Project, supply the balance of electricity needed at the Greenfield WWTP. Reducing the purchase of power from the grid to supply the load on-site would potentially reduce the electricity purchased by $129,000.

5. The Project is commercially viable based upon the economic analysis shown below.

The Project Economics

CRMC assessed the preliminary economics of the Project by preparing an economic pro forma to estimate and project the investment required, revenues, expenses, and earnings. Specifically, CRMC estimated the investment required to fund pre-construction and construction costs of the Project based upon (1) scaling of CRMC actual equipment, and installation costs developing, and installing the CRMC Bioenergy Facility, (2) quotations from equipment vendors, and (3) and engineering estimates. CRMC estimated the potential revenues based upon (1) CRMC actual revenues from the CRMC Bioenergy Facility, (2) information from the Client on its current sludge and electricity costs that would be avoided costs to other parties but rather used to fund the revenues of the Project, and (3) engineering estimates. CRMC estimated the operating costs based upon (1) CRMC actual operating costs to operate the CRMC Bioenergy Facility, (2) information from the Client on its current operations and those operations that would be integral, and (3) engineering estimates. CRMC prepared an economic pro forma that shows the capital cost build-up, revenues, operating expenses, cash flows without depreciation and tax effects.
Note that avoided costs (e.g. electricity) are shown as revenues to the Project for purposes of assessing the economic viability of the Project.

CRMC assessed the performance of the Project economics for three cases (a base, worst and best cases) by calculating new sludge disposal fees at the Project together with other revenue assumptions to meet operating costs and debt service on the capital expenditure using 100% debt financing.

An economic pro forma was developed for three cases including (1) a Base Case, as shown in Tables 5, that projects the economics under a reasonable set of market assumptions, (2) a Worst Case, as shown in Tables 6, that projects the economics under a set of market conditions that are plausible and would not benefit the economics of the Project, and (3) a Best Case, as shown in Tables 7, that projects the economics under a set of market conditions that are plausible and would benefit the economics of the Project. For all cases, a build-up of the Investment requirement is shown in Table 8.

Base case and sensitivities around key economic parameters are shown below in Table 12 - Alternative Cases for Preliminary Economics.

Table 12: Alternative Cases for Preliminary Economics

Parameter	Base Case	Worst Case	Best Case
Investment assumptions	$7.3 million with no grants, Includes allowances for pre-construction costs, construction costs, and financing costs.	Same as Base case	$7.3 million with grants of up to 25% of capital cost or $1.8 million to lower financed amount to $5.5 million
Revenue Assumptions			
Sludge	7.4 million gallons of sludge annually including 2.1 million gallons of sludge from Greenfield WWTP and 5.3 million gallons of sludge from other area WWTPs. Disposal fees for sludge at Project are calculated below.	Same as Base case	Same as Base case
Organic material disposal fees	$0.10 per gallon escalating at 3% annually	$0.07 per gallon and no escalation	Same as Base Case
Power	Avoided cost of $133.70 per MWh or $130,000 annually escalating at 2% annually.	Same as Base Case but no escalation	Same as Base Case escalating at 4% annually
MA Class 1 REC sales	$15 per MWh and no escalation	Same as Base Case	$30 per MWh with no escalation
MA APS RECs sales	36% thermal recovery, and $18.50 per MWh and no escalation	Same as Base Case	Same as Base case but $20.00 per MWh
Carbon credit sales	None. Possible future revenue source but too uncertain to quantify.	Same as Base Case	Same as Base Case.
Expense Assumptions			
AD labor and management	Incremental labor of 2 full time employees annually at $56,025 (wages and benefits) each escalating at 2% annually	Same as Base Case	Same as Base Case
Supplies	Limited to polymer, ferric chloride, and small quantity of chemicals costs escalating at 2% annually	Same as Base Case	Same as Base Case
Residual disposal	$100 per ton escalating at 2% annually for transport and disposal of screenings of 192	Same as Base Case solid digestate of 2,744 TPY transport	Same as Base Case

Parameter	Base Case	Worst Case	Best Case
	tons per year. Solid digestate of 2,744 tons per year transported to Montague composting at $15 per transport and $0 cost disposal.	and dispose in LF at $100 per ton escalating at 2%.	
O&M power plant	$25 per MWhr escalating at 2% annually (A portion of the 2 full time employees labor is not included in this cost)	Same as Base case	Same as Base case
Incremental Administration and Insurance	$30,000 annually escalating at 2% annually	Same as Base Case	Same as Base Case
Project Economic Results:	***At 100% Debt Financing of Project***		
Sludge disposal fee to service 100% debt financed, 15 year term, 3.5% interest (AA rated), at or >1.2 debt service ratio. [2]	$0.115 per gallon escalating at 1% Greenfield disposal fee = $240,000 per year, and other WWTPs = $610,000 per year with no escalation required.	$0.155 per gallon escalating at 1% Greenfield disposal fee = $323,000 per year, and other WWTPs = $821,000 per year escalating at 1%	$0.084 per gallon and no escalation. Greenfield disposal fee = $175,000 per year, and other WWTPs = $445,000 with no escalation required.
Surplus cash generated annually after all operating costs and debt service funded.	$138,000 to $148,000	$133,000 to $142,000	$102,000 to $143,000
Potential first year savings over existing sludge management for Greenfield	$240,000 plus surplus cash	$157,000 plus surplus cash	$305,000 plus surplus cash
Potential first year savings over existing sludge management for other area WWTPs	$124,000 less transport cost	($87,000) less transport cost	$289,000 less transport cost

[2] Greenfield face a cost of $480,000 for fiscal year 2019 to transport and disposal of its 2.1 million gallons per year of sludge at an average solids content of 5 percent. Other WWTPs in the area face a cost of $734,000 for fiscal year 2019 to transport and disposal of its 5.3 million gallons per year of sludge at an average solids content of 2.6 percent.

Impact of implementing Project Options of Project Economics

Increase capacity of Project.

The added process equipment and operation to thicken sludge is estimated at an incremental capital cost of $200,000 and the incremental operating costs of $56,000 per year. The resulting increase in capacity would generate approximately $356,000 annually in incremental revenues assuming Client received an additional 13,000 gallons per day of sludge at $0.075 per gallon, which would provide a 1-year simple payback on implementing the Project option and would increase the surplus cash after paying operating costs and debt service.

Treat filtrate to remove nitrogen and phosphorus.

Installing and operating the nitrogen removal system is estimated at an incremental capital cost of approximately $1,000,000 and the incremental operating costs of $95,000 per year. The resulting removal system would not provide incremental revenues but rather a cost to the Project. Adding these costs to the Project economics under the Base Case would increase the disposal fees required from $0.115 to $0.14 per gallon. Under these conditions, the Project economics would likely be marginal when compared to the current typical market rates for disposal, although less expensive than Client's current costs. Note that if Greenfield WWTP anticipates that nitrogen removal will have to be added to the Greenfield WWTP to address more stringent nitrogen effluent requirements to be imposed in the NPDES permit, the Client may choose to view treatment of nitrogen as a future sunk cost that would not be considered at this point in its assessment of this Project.

Adding ferric chloride in incremental quantities to precipitate and remove phosphorus from the filtrate would cost less than $2,000 per year in cost, which is not significant.

Economic conclusions:

The Base Case shows that an $0.115 per gallon sludge disposal fee with no escalation annually could be achieved for all WWTPs on a 100% debt financing of the Project, which is a sludge disposal fee that would provide the Client and area WWTPs substantial savings compared to the fees they currently pay.

The Worst Case shows that an $0.155 escalating at 1-percent annually per gallon sludge disposal fee could be achieved for a 100% debt financing of the Project, which is higher than current typical market rates for transporting and disposal of sludge generated by the WWTPs.

The Best Case shows that an $0.084 per gallon sludge disposal fee with no escalation annually could be achieved for all WWTPs on a 100% debt financing of the Project, which is a sludge disposal fee that would provide the Client and area WWTPs substantial savings compared to the fees they currently pay.

The Best Case shows the impact of obtaining grants at a level that was recently accomplished by the Greater Lawrence Sanitary District, which grants represented 25% of the construction cost of their project. Note that the Greater Lawrence Sanitary District obtained State grants totaling approximately $6 million toward a $24 million-dollar project that included a large-scale anaerobic digester and biogas-to-energy facility. The $6 million of grants included a $5 million grant from the Department of Energy Resources Community Clean Energy Resiliency Initiative, a $0.4 million grant from the Massachusetts Clean Energy Center, and a $0.5 million grant from the Massachusetts Department of Environmental Projection. State programs such as these continue to assist development and construction of facilities such as the Project described herein.

The Project Economics can be substantially improved by lowering the investment through grants provided by State and Federal agencies. Supporting the development of anaerobic digester and biogas-to-energy projects are several grants and financing enhancements from Federal and Massachusetts State programs. The MassDEP provides a comprehensive list of all potential financial and technical assistance programs, which is summarized in Table 12 – Listing of Financial and Technical Assistance Programs.

Substantial grants have been provided to support Massachusetts project that process organic material by anaerobic digestion and generate electric power over the past few years. The most active programs that have and continue to issue financial assistance to projects in the form of grants include the Massachusetts Clean Energy Center, the Massachusetts Department of Energy Resources, and the Massachusetts Department of Environmental Protection.

Project Risks:

Although the Project offers the potential to provide significant value to the Client under Base and Best Case conditions, the Client needs to be aware of the Project risks that might cause the Project to be sufficiently less attractive than indicated by the analysis above. In particular:

1. Project development and construction costs might exceed the values assumed in the analysis for a wide variety of reasons that might become apparent only after additional design and engineering work is completed; as a result of permit conditions that are imposed during the development process; or as a result of delays or cost overruns during construction and start- up of the Project.
2. Operation and maintenance costs might exceed the values assumed in the analysis due to need for or cost of additional labor or other factors that become apparent only after additional work on Project design and the approach to operations is completed.
3. The Project might perform at a lower level than has been anticipated due to unforeseen composition, or changes in composition, of the sludge from the Greenfield WWTP and other area WWTPs or in unforeseen changes in composition of incoming organic materials.
4. Quantities of sludge projected may not be available to the Project from the area WWTPs and at the tip fees that have been assumed in the analysis.
5. Liquid organic waste in readily pumpable form might not be available in the quantities and at the tip fees that have been assumed in the analysis.

6. Elevated levels of nitrogen in the filtrate returned to the Greenfield WWTP may cause exceedances of future requirements that may be imposed in a new NPDES Permit if untreated.
7. Low cost debt financing of the Project may not be available to Greenfield based on its priorities for other capital projects and borrowing capacity.

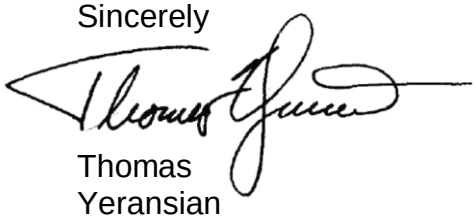
The Project Conclusions and Recommendations

The Project offers the potential to achieve the objectives stated by the Client including reducing the quantity of sludge required for disposal, providing a modest quantity of disposal capacity for pumpable source-separated organic material such as FOG or food waste, and generating sufficient quantities of biogas to be used to generate electricity and heat for use by the Project and the Greenfield WWTP. The Project could (1) provide an opportunity for the Client to manage sludge and source-separated organic material in pumpable form generated in the area, and (2) protect the Client from sludge disposal being unavailable in the future, or if available, at elevated and uncontrollable costs of sludge transportation and disposal. The economics for the Base Case are reasonable and if funded by low cost debt, which may be available to the Client, could represent substantial savings to the Client and area WWTPs. Grants could offset the up- front investment and provide some protection to the Client against occurrence of Project risks and the worst-case scenario. Therefore, CRMC recommends that if the Client pursues the Project, the Client should seek grant funding to reduce the investment that would be required by the Town, with a target for funding of the 25 percent to match that achieved by the Greater Lawrence Sanitary District project. This level of financial subsidy would increase the likelihood of success in maintaining surplus cash flows and reasonable sludge disposal fees under the likely future market scenarios.

If the Client decides to move forward with the Project, CRMC recommends that the Client seek alternative transport and disposal arrangements for sludge generated by Greenfield WWTP at the earliest possible time through the estimated commencement of the Project. If the Client decides not to pursue the Project, CRMC recommends that the Client seek a new arrangement for long- term transport and disposal of sludge generated by Greenfield WWTP.

Please feel free to call me with questions at (508) 339-3074.

Sincerely

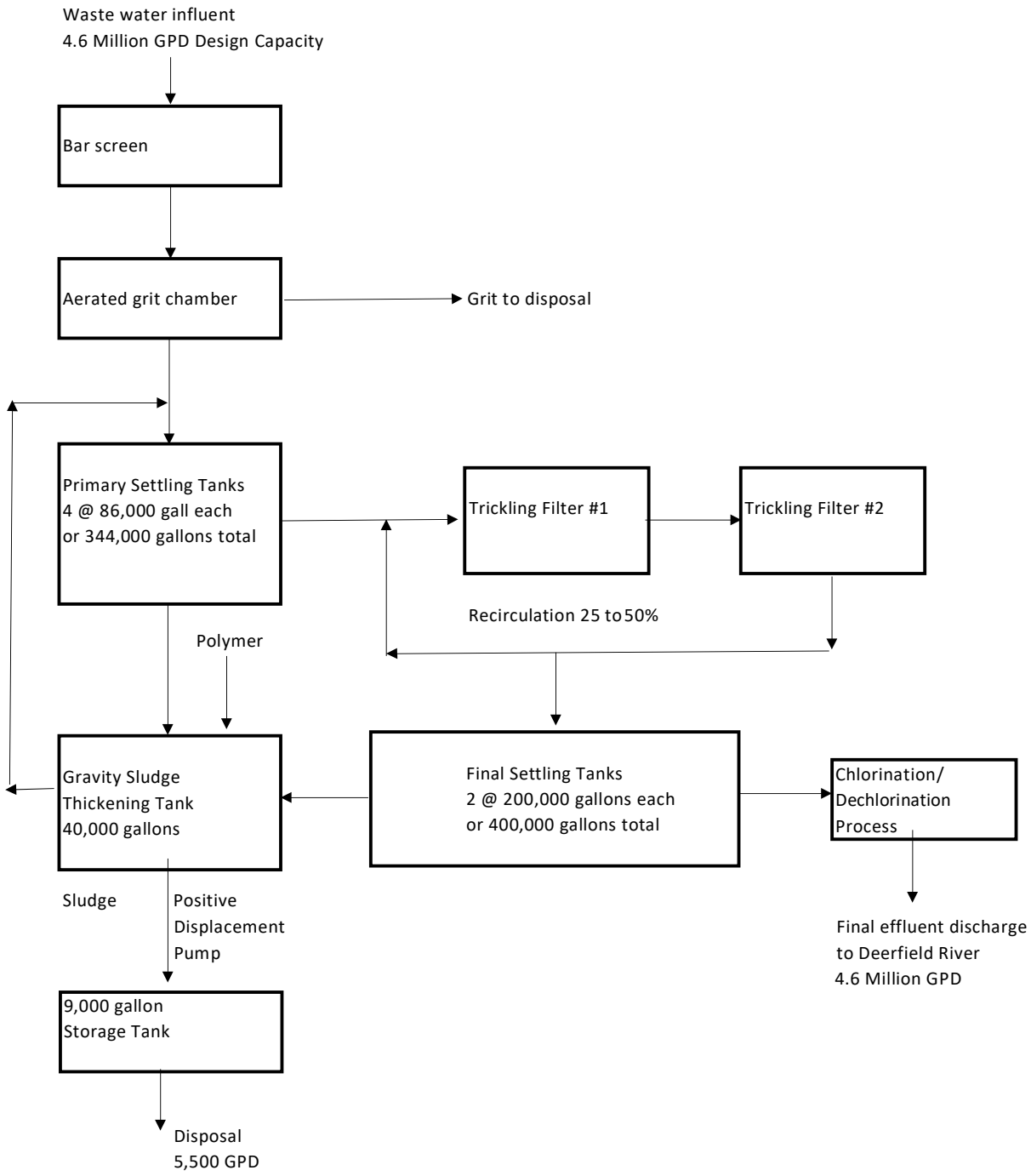


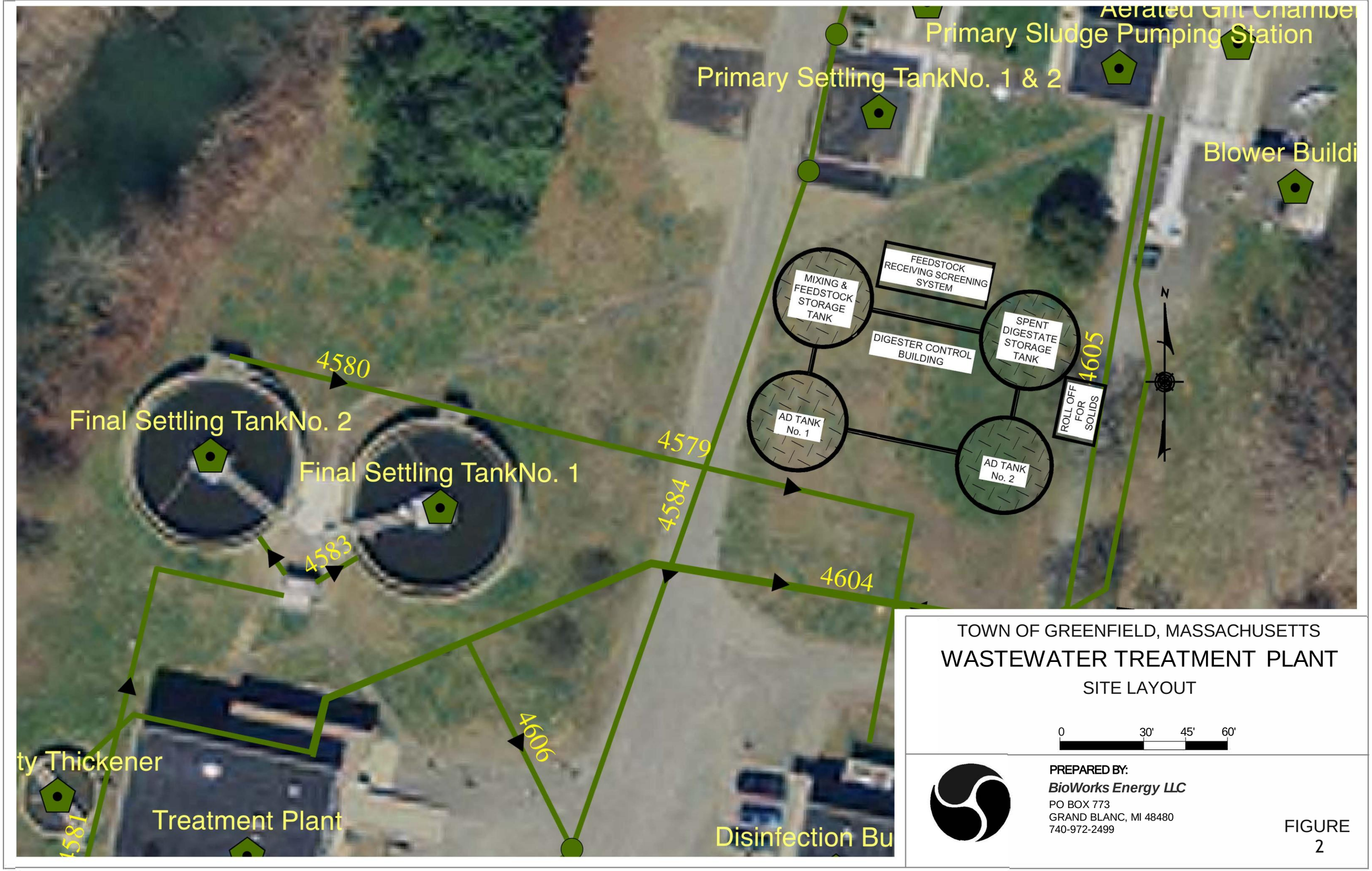
Thomas
Yeransian

Attachments

FIGURE 1

GREENFIELD WASTE WATER TREATMENT PROCESS FLOW DIAGRAM





TOWN OF GREENFIELD, MASSACHUSETTS

WASTEWATER TREATMENT PLANT

SITE LAYOUT

0 30' 45' 60'

PREPARED BY:

BioWorks Energy LLC

PO BOX 773
GRAND BLANC, MI 48480
740-972-2499

FIGURE 2

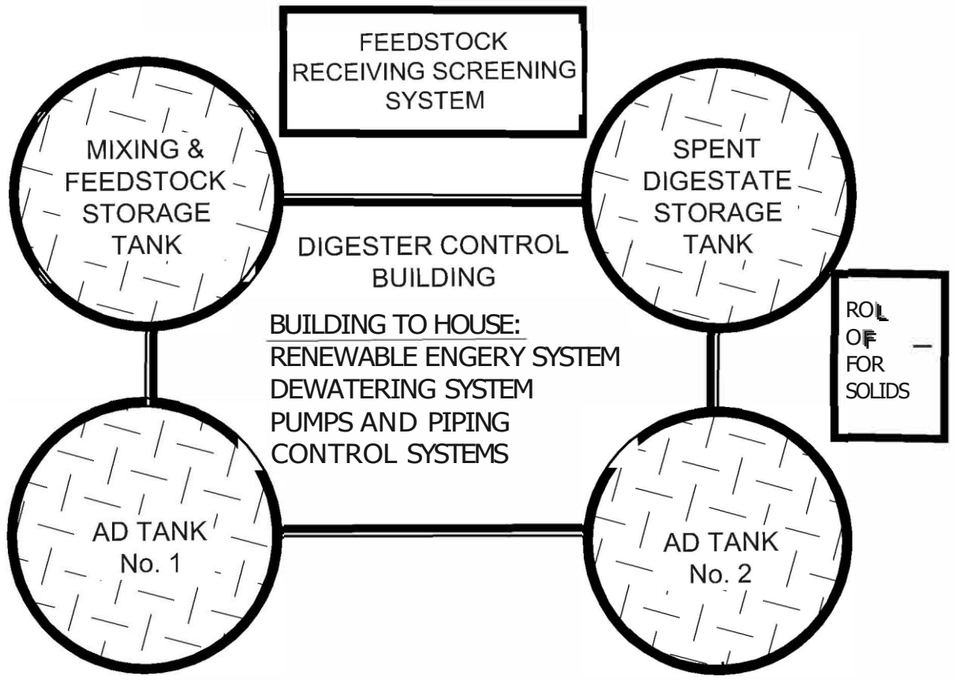
TOWN OF GREENFIELD, MASSACHUSETTS

ALTERNATIVE SITE LAYOUT

0 30' 45' 60'

PREPARED BY:
BioWorks Energy LLC
PO BOX 773
GRAND BLANC, MI 48480
740-972-2499

FIGURE 3



TOWN OF GREENFIELD, MASSACHUSETTS

PROJECT GENERAL ARRANGEMENT

0 20' 30' 40'

PREPARED BY:
BioWorks Energy LLC
PO BOX 773
GRAND BLANC, MI 48480
740-972-2499

FIGURE
4

FIGURE 5

PROCESS FLOW DIAGRAM OF THE PROJECT AT THE GREENFIELD WWTP

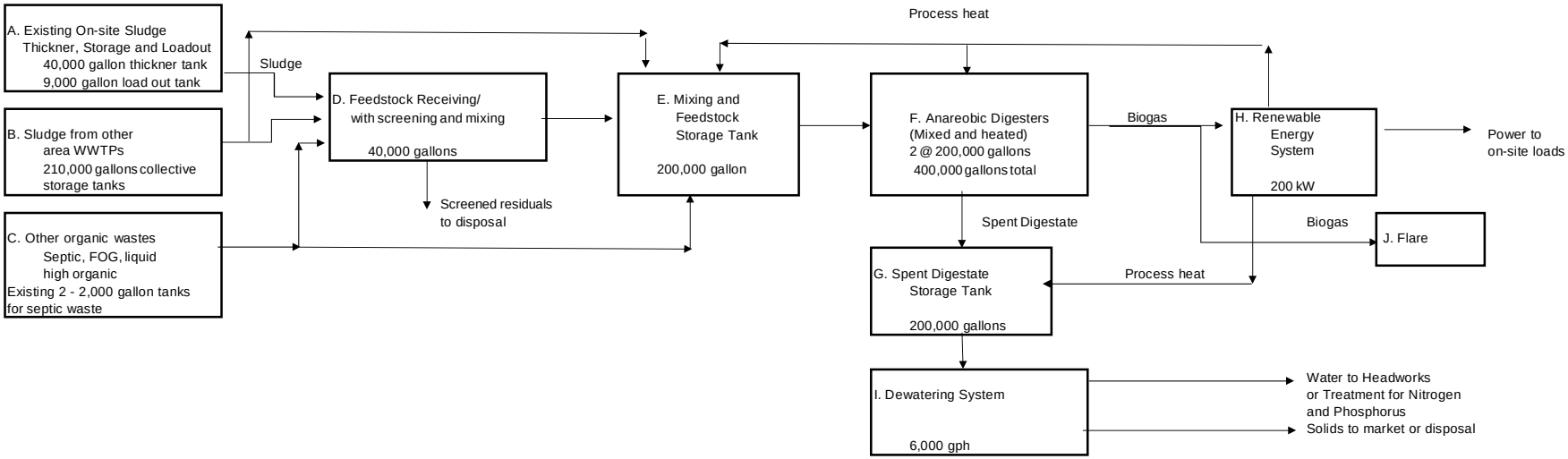
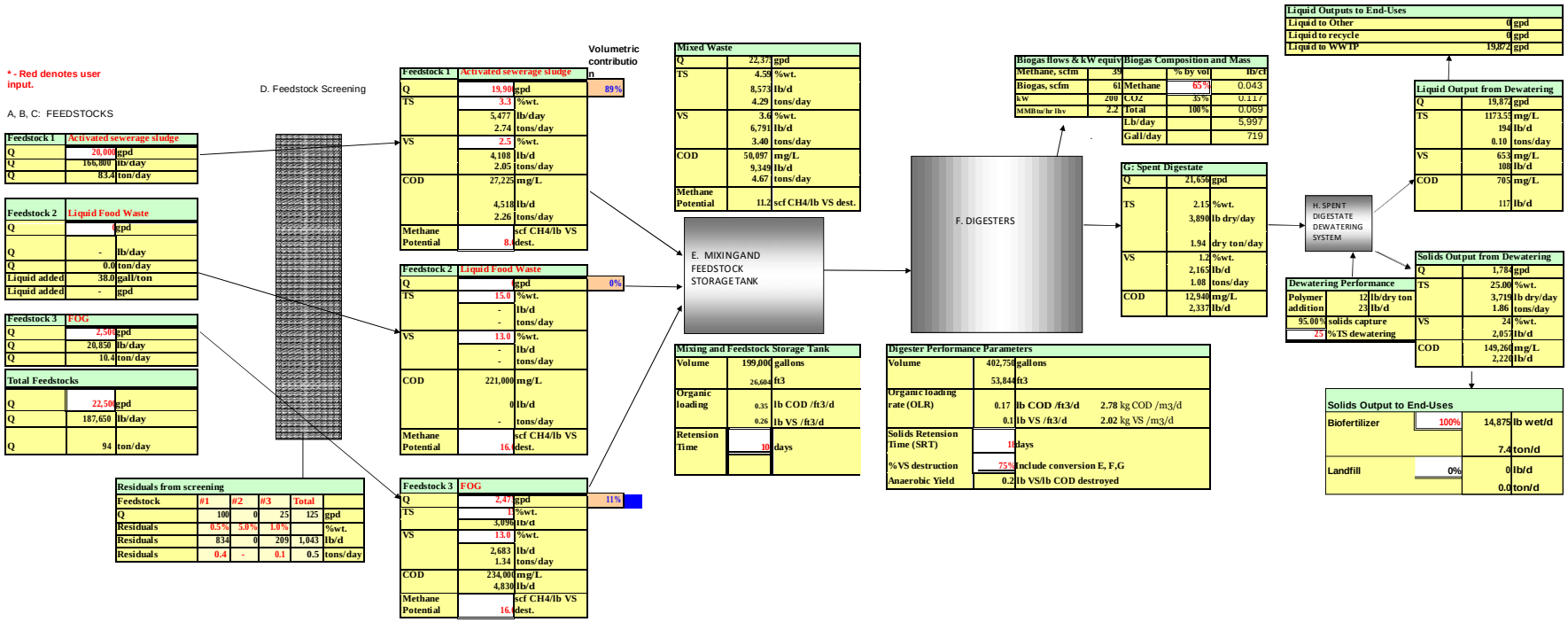


FIGURE 6 - MASS BALANCE

A simple mass balance for a mesophilic CSTR low solids digester



Feedstock 1	Activated sewerage sludge	
Q	20,000	gpd
Q	166,800	lb/day
Q	83.4	ton/day

Feedstock 2	Liquid Food Waste	
Q		gpd
Q	-	lb/day
Q	0.0	ton/day
Liquid added	38.0	gall/ton
Liquid added	-	gpd

Feedstock 3	FOG	
Q	2,500	gpd
Q	20,850	lb/day
Q	10.4	ton/day

Total Feedstocks		
Q	22,500	gpd
Q	187,650	lb/day
Q	94	ton/day

Residuals from screening					
Feedstock	#1	#2	#3	Total	
Q	100	0	25	125	gpd
Residuals	0.5%	5.0%	1.0%		%wt.
Residuals	834	0	209	1,043	lb/d
Residuals	0.4	-	0.1	0.5	tons/day

Feedstock 1	Activated sewerage sludge		Volumetric contribution
Q	19,900	gpd	89%
TS	3.3	%wt.	
	5,477	lb/day	
	2.74	tons/day	
VS	2.5	%wt.	
	4,108	lb/d	
	2.05	tons/day	
COD	27,225	mg/L	
	4,518	lb/d	
	2.26	tons/day	
Methane Potential		scf CH4/lb VS	
	8.4	dest.	

Feedstock 2	Liquid Food Waste		
Q		gpd	0%
TS	15.0	%wt.	
	-	lb/d	
	-	tons/day	
VS	13.0	%wt.	
	-	lb/d	
	-	tons/day	
COD	221,000	mg/L	
	0	lb/d	
	-	tons/day	
Methane Potential		scf CH4/lb VS	
	16.6	dest.	

Feedstock 3	FOG		
Q	2,475	gpd	11%
TS	12	%wt.	
	3,090	lb/d	
VS	13.0	%wt.	
	2,683	lb/d	
	1.34	tons/day	
COD	234,000	mg/L	
	4,830	lb/d	
Methane Potential		scf CH4/lb VS	
	16.6	dest.	

Mixed Waste		
Q	22,375	gpd
TS	4.59	%wt.
	8,573	lb/d
	4.29	tons/day
VS	3.6	%wt.
	6,791	lb/d
	3.40	tons/day
COD	50,097	mg/L
	9,349	lb/d
	4.67	tons/day
Methane Potential	11.2	scf CH4/lb VS dest.

Mixing and Feedstock Storage Tank		
Volume	199,000	gallons
	26,604	ft3
Organic loading	0.35	lb COD /ft3/d
	0.26	lb VS /ft3/d
Retension Time	10	days

Biogas flows & kW equiv			% by vol	lb/cf
Methane, scfm	39			
Biogas, scfm	61	Methane	65%	0.043
kW	200	CO2	35%	0.117
MMBtu/hr lhv	2.2	Total	100%	0.069
		Lb/day		5,997
		Gall/day		719

G: Spent Digestate		
Q	21,650	gpd
TS	2.15	%wt.
	3,890	lb dry/day
	1.94	dry ton/day
VS	1.2	%wt.
	2,165	lb/d
	1.08	tons/day
COD	12,940	mg/L
	2,337	lb/d

Digester Performance Parameters			
Volume	402,750	gallons	
	53,844	ft3	
Organic loading rate (OLR)	0.17	lb COD /ft3/d	2.78 kg COD /m3/d
	0.1	lb VS /ft3/d	2.02 kg VS /m3/d
Solids Retension Time (SRT)	18	days	
% VS destruction	75%	include conversion E, F,G	
Anaerobic Yield	0.2	lb VS/lb COD destroyed	

Liquid Outputs to End-Uses		
Liquid to Other	0	gpd
Liquid to recycle	0	gpd
Liquid to WWTP	19,872	gpd

Liquid Output from Dewatering		
Q	19,872	gpd
TS	1173.53	mg/L
	194	lb/d
	0.10	tons/day
VS	653	mg/L
	108	lb/d
COD	705	mg/L
	117	lb/d

Dewatering Performance		
Polymer addition	12	lb/dry ton
	23	lb/d
95.00%	solids capture	
25	%TS dewatering	

Solids Output from Dewatering		
Q	1,784	gpd
TS	25.00	%wt.
	3,719	lb dry/day
	1.86	tons/day
VS	24	%wt.
	2,057	lb/d
COD	149,260	mg/L
	2,220	lb/d

Solids Output to End-Uses			
Biofertilizer	100%	14,875	lb wet/d
		7.4	ton/d
Landfill	0%	0	lb/d
		0.0	ton/d

TABLE 2

DIMENSIONS OF TANKS, BUILDING AND EQUIPMENT

TANKS, BUILDING, EQUIPMENT	Functional Storage Volume, Gallons	Height, feet	Freeboard, feet	Diameter or lengths, feet	Bottom area, square feet	Calculated Capacity Volume, cubic feet	Calculated Capacity Volume, Gallons	Actual Capacity wilth Freeboard Volume,	Actual Capacity wilth Freeboard Volume, Gallons
Feedstock storage									
Underground	40,841	12	1.6	15 X 40	525	6,300	47,124	5,460	40,841
Mixing tank									
Above ground	201,704	33	2.5	33.56	884	29,176	218,237	26,966	201,704
Digester									
#1 above ground	201,704	33	2.5	33.56	884	29,176	218,237	26,966	201,704
#2 above ground	201,704	33	2.5	33.56	884	29,176	218,237	26,966	201,704
Digestate storage									
Above ground	201,704	33	2.5	33.56	884	29,176	218,237	26,966	201,704
Roll Off	9,000	6.8			184	1,257	9,405	1,257	9,405
Building					1,800				
Renewable Energy System					560				
Dewatering System					300				
Pump station					260				

TABLE 5: PROJECT ECONOMICS: BASE CASE (100% DEBT FINANCED)																	
YEAR:			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Revenues																	
Organic material disposal fee			$ 82,125	$ 84,589	$ 87,126	$ 89,740	$ 92,432	$ 95,205	$ 98,062	$ 101,003	$ 104,033	$ 107,154	$ 110,369	$ 113,680	$ 117,091	$ 120,603	$ 124,221
Greenfield sludge disposal fee			$ 239,887	$ 239,887	$ 239,887	$ 239,887	$ 239,887	$ 239,887	$ 239,887	$ 239,887	$ 239,887	$ 239,887	$ 239,887	$ 239,887	$ 239,887	$ 239,887	$ 239,887
Other WWTP sludge disposal fee			$ 609,729	$ 609,729	$ 609,729	$ 609,729	$ 609,729	$ 609,729	$ 609,729	$ 609,729	$ 609,729	$ 609,729	$ 609,729	$ 609,729	$ 609,729	$ 609,729	$ 609,729
Digestate solids sales			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Power (avoided cost) and RECs sales			$ 186,501	$ 189,081	$ 191,713	$ 194,398	$ 197,136	$ 199,929	$ 202,778	$ 205,684	$ 208,648	$ 211,672	$ 214,755	$ 217,901	$ 221,109	$ 224,382	$ 227,720
Total			$ 1,118,242	$ 1,123,286	$ 1,128,455	$ 1,133,754	$ 1,139,184	$ 1,144,751	$ 1,150,456	$ 1,156,303	$ 1,162,298	$ 1,168,442	$ 1,174,741	$ 1,181,197	$ 1,187,816	$ 1,194,601	$ 1,201,557
Expenses																	
Operations AD			$ 112,050	$ 114,291	$ 116,577	$ 118,908	$ 121,287	$ 123,712	$ 126,186	$ 128,710	$ 131,284	$ 133,910	$ 136,588	$ 139,320	$ 142,106	$ 144,949	$ 147,848
Operations Power Plant			$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801
Supplies and Outside Services			$ 52,926	$ 53,984	$ 55,064	$ 56,165	$ 57,288	$ 58,434	$ 59,603	$ 60,795	$ 62,011	$ 63,251	$ 64,516	$ 65,806	$ 67,122	$ 68,465	$ 69,834
Repairs			$ 35,000	$ 35,700	$ 36,414	$ 37,142	$ 37,885	$ 38,643	$ 39,416	$ 40,204	$ 41,008	$ 41,828	$ 42,665	$ 43,518	$ 44,388	$ 45,276	$ 46,182
Residuals disposal			$ 60,406	$ 61,614	$ 62,846	$ 64,103	$ 65,385	$ 66,693	$ 68,027	$ 69,388	$ 70,775	$ 72,191	$ 73,635	$ 75,107	$ 76,609	$ 78,142	$ 79,704
Administration			$ 10,000	$ 10,200	$ 10,404	$ 10,612	$ 10,824	$ 11,041	$ 11,262	$ 11,487	$ 11,717	$ 11,951	$ 12,190	$ 12,434	$ 12,682	$ 12,936	$ 13,195
Insurance			$ 20,000	$ 20,400	$ 20,808	$ 21,224	$ 21,649	$ 22,082	$ 22,523	$ 22,974	$ 23,433	$ 23,902	$ 24,380	$ 24,867	$ 25,365	$ 25,872	$ 26,390
Total			$ 334,183	$ 339,990	$ 345,914	$ 351,957	$ 358,120	$ 364,406	$ 370,818	$ 377,358	$ 384,030	$ 390,834	$ 397,775	$ 404,854	$ 412,075	$ 419,441	$ 426,954
Net Income			$ 784,059	$ 783,295	$ 782,541	$ 781,797	$ 781,065	$ 780,345	$ 779,638	$ 778,945	$ 778,268	$ 777,608	$ 776,966	$ 776,343	$ 775,741	$ 775,160	$ 774,604
Debt Payments (Principal + Interest)			$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716
Surplus Cash			$ 148,342	$ 147,579	$ 146,825	$ 146,081	$ 145,348	$ 144,628	$ 143,921	$ 143,229	$ 142,552	$ 141,892	$ 141,249	$ 140,626	$ 140,024	$ 139,444	$ 138,887
Debt Service Ratio (1.2 or greater)			1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Investment																	
Preconstruction costs		$ 490,000															
Construction costs																	
Anaerobic Digestion Facility		$ 5,690,807															
Renewable Energy System (0.2 MW)		$ 310,000															
Dewatering Systems		$ 181,000															
Grants		$ -															
Subtotal		$ 6,671,807															
Debt closing costs		$ 100,000															
Debt service reserve fund		$ 300,000															
Capitalized interest		$ 250,000															
Total		$ 7,321,807															

TABLE 6: PROJECT ECONOMICS: WORST CASE (100% DEBT FINANCED)

YEAR:			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Revenues																	
	Organic material disposal fee		$ 57,488	$ 57,488	$ 57,488	$ 57,488	$ 57,488	$ 57,488	$ 57,488	$ 57,488	$ 57,488	$ 57,488	$ 57,488	$ 57,488	$ 57,488	$ 57,488	$ 57,488
	Greenfield sludge disposal fee		$ 323,326	$ 326,559	$ 329,825	$ 333,123	$ 336,454	$ 339,819	$ 343,217	$ 346,649	$ 350,116	$ 353,617	$ 357,153	$ 360,725	$ 364,332	$ 367,975	$ 371,655
	Other WWTP sludge disposal fee		$ 821,808	$ 830,027	$ 838,327	$ 846,710	$ 855,177	$ 863,729	$ 872,366	$ 881,090	$ 889,901	$ 898,800	$ 907,788	$ 916,866	$ 926,034	$ 935,295	$ 944,648
	Digestate solids sales		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Power (avoided cost) and RECs sales		$ 183,971	$ 183,971	$ 183,971	$ 183,971	$ 183,971	$ 183,971	$ 183,971	$ 183,971	$ 183,971	$ 183,971	$ 183,971	$ 183,971	$ 183,971	$ 183,971	$ 183,971
	Total		$ 1,386,593	$ 1,398,044	$ 1,409,610	$ 1,421,292	$ 1,433,090	$ 1,445,006	$ 1,457,042	$ 1,469,198	$ 1,481,475	$ 1,493,875	$ 1,506,399	$ 1,519,049	$ 1,531,825	$ 1,544,728	$ 1,557,761
Expenses																	
	Operations AD		$ 112,050	$ 114,291	$ 116,577	$ 118,908	$ 121,287	$ 123,712	$ 126,186	$ 128,710	$ 131,284	$ 133,910	$ 136,588	$ 139,320	$ 142,106	$ 144,949	$ 147,848
	Operations Power Plant		$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801
	Supplies and Outside Services		$ 52,926	$ 53,984	$ 55,064	$ 56,165	$ 57,288	$ 58,434	$ 59,603	$ 60,795	$ 62,011	$ 63,251	$ 64,516	$ 65,806	$ 67,122	$ 68,465	$ 69,834
	Repairs		$ 35,000	$ 35,700	$ 36,414	$ 37,142	$ 37,885	$ 38,643	$ 39,416	$ 40,204	$ 41,008	$ 41,828	$ 42,665	$ 43,518	$ 44,388	$ 45,276	$ 46,182
	Residuals disposal		$ 60,406	$ 61,614	$ 62,846	$ 64,103	$ 65,385	$ 66,693	$ 68,027	$ 69,388	$ 70,775	$ 72,191	$ 73,635	$ 75,107	$ 76,609	$ 78,142	$ 79,704
	Administration		$ 10,000	$ 10,200	$ 10,404	$ 10,612	$ 10,824	$ 11,041	$ 11,262	$ 11,487	$ 11,717	$ 11,951	$ 12,190	$ 12,434	$ 12,682	$ 12,936	$ 13,195
	Insurance		$ 20,000	$ 20,400	$ 20,808	$ 21,224	$ 21,649	$ 22,082	$ 22,523	$ 22,974	$ 23,433	$ 23,902	$ 24,380	$ 24,867	$ 25,365	$ 25,872	$ 26,390
	Total		$ 334,183	$ 339,990	$ 345,914	$ 351,957	$ 358,120	$ 364,406	$ 370,818	$ 377,358	$ 384,030	$ 390,834	$ 397,775	$ 404,854	$ 412,075	$ 419,441	$ 426,954
Net Income			$ 1,052,410	$ 1,058,054	$ 1,063,696	$ 1,069,335	$ 1,074,970	$ 1,080,600	$ 1,086,224	$ 1,091,839	$ 1,097,445	$ 1,103,041	$ 1,108,624	$ 1,114,194	$ 1,119,749	$ 1,125,287	$ 1,130,807
Debt Payments (Principal + Interest)			$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716	$ 635,716
Surplus Cash			$ 142,286	$ 142,441	$ 142,485	$ 142,415	$ 142,226	$ 141,915	$ 141,479	$ 140,914	$ 140,216	$ 139,382	$ 138,406	$ 137,286	$ 136,017	$ 134,595	$ 133,015
Debt Service Ratio (1.2 or greater)			1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.21	1.21	1.21

Investment	
Preconstruction costs	$ 490,000
Construction costs	
Anaerobic Digestion Facility	$ 5,690,807
Renewable Energy System (0.2 MW)	$ 310,000
Dewatering Systems	$ 181,000
Grants	$ -
Subtotal	$ 6,671,807
Debt closing costs	$ 100,000
Debt service reserve fund	$ 300,000
Capitalized interest	$ 250,000
Total	$ 7,321,807

TABLE 7: PROJECT ECONOMICS: BEST CASE (100% DEBT FINANCED)																	
YEAR:		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Revenues																	
Organic material disposal fee		$ 82,125	$ 82,125	$ 82,125	$ 82,125	$ 82,125	$ 82,125	$ 82,125	$ 82,125	$ 82,125	$ 82,125	$ 82,125	$ 82,125	$ 82,125	$ 82,125	$ 82,125
Greenfield sludge disposal fee		$ 175,222	$ 175,222	$ 175,222	$ 175,222	$ 175,222	$ 175,222	$ 175,222	$ 175,222	$ 175,222	$ 175,222	$ 175,222	$ 175,222	$ 175,222	$ 175,222	$ 175,222
Other WWTP sludge disposal fee		$ 445,367	$ 445,367	$ 445,367	$ 445,367	$ 445,367	$ 445,367	$ 445,367	$ 445,367	$ 445,367	$ 445,367	$ 445,367	$ 445,367	$ 445,367	$ 445,367	$ 445,367
Digestate solids sales		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Power (avoided cost) and RECs sales		$ 215,426	$ 220,688	$ 226,160	$ 231,852	$ 237,771	$ 243,927	$ 250,329	$ 256,987	$ 263,911	$ 271,113	$ 278,602	$ 286,391	$ 294,492	$ 302,917	$ 311,678
Total		$ 918,140	$ 923,402	$ 928,874	$ 934,566	$ 940,485	$ 946,641	$ 953,043	$ 959,701	$ 966,625	$ 973,827	$ 981,316	$ 989,105	$ 997,206	$ 1,005,631	$ 1,014,392
Expenses																
Operations AD		$ 112,050	$ 114,291	$ 116,577	$ 118,908	$ 121,287	$ 123,712	$ 126,186	$ 128,710	$ 131,284	$ 133,910	$ 136,588	$ 139,320	$ 142,106	$ 144,949	$ 147,848
Operations Power Plant		$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801	$ 43,801
Supplies and Outside Services		$ 52,926	$ 53,984	$ 55,064	$ 56,165	$ 57,288	$ 58,434	$ 59,603	$ 60,795	$ 62,011	$ 63,251	$ 64,516	$ 65,806	$ 67,122	$ 68,465	$ 69,834
Repairs		$ 35,000	$ 35,700	$ 36,414	$ 37,142	$ 37,885	$ 38,643	$ 39,416	$ 40,204	$ 41,008	$ 41,828	$ 42,665	$ 43,518	$ 44,388	$ 45,276	$ 46,182
Residuals disposal		$ 60,406	$ 61,614	$ 62,846	$ 64,103	$ 65,385	$ 66,693	$ 68,027	$ 69,388	$ 70,775	$ 72,191	$ 73,635	$ 75,107	$ 76,609	$ 78,142	$ 79,704
Administration		$ 10,000	$ 10,200	$ 10,404	$ 10,612	$ 10,824	$ 11,041	$ 11,262	$ 11,487	$ 11,717	$ 11,951	$ 12,190	$ 12,434	$ 12,682	$ 12,936	$ 13,195
Insurance		$ 20,000	$ 20,400	$ 20,808	$ 21,224	$ 21,649	$ 22,082	$ 22,523	$ 22,974	$ 23,433	$ 23,902	$ 24,380	$ 24,867	$ 25,365	$ 25,872	$ 26,390
Total		$ 334,183	$ 339,990	$ 345,914	$ 351,957	$ 358,120	$ 364,406	$ 370,818	$ 377,358	$ 384,030	$ 390,834	$ 397,775	$ 404,854	$ 412,075	$ 419,441	$ 426,954
Net Income		$ 583,957	$ 583,411	$ 582,960	$ 582,609	$ 582,365	$ 582,235	$ 582,225	$ 582,342	$ 582,596	$ 582,993	$ 583,542	$ 584,251	$ 585,131	$ 586,190	$ 587,439
Debt Payments (Principal + Interest)		$ 479,431	$ 479,431	$ 479,431	$ 479,431	$ 479,431	$ 479,431	$ 479,431	$ 479,431	$ 479,431	$ 479,431	$ 479,431	$ 479,431	$ 479,431	$ 479,431	$ 479,431
Surplus Cash		$ 104,526	$ 103,980	$ 103,529	$ 103,178	$ 102,934	$ 102,803	$ 102,793	$ 102,911	$ 103,165	$ 103,561	$ 104,110	$ 104,820	$ 105,699	$ 106,759	$ 108,007
Debt Service Ratio (1.2 or greater)		1.22	1.22	1.22	1.22	1.21	1.21	1.21	1.21	1.22	1.22	1.22	1.22	1.22	1.22	1.23
Investment																
Preconstruction costs	$ 490,000															
Construction costs																
Anaerobic Digestion Facility	$ 5,690,807															
Renewable Energy System (0.2 MW)	$ 310,000															
Dewatering Systems	$ 181,000															
Grants	$ (1,800,000)															
Subtotal	$ 4,871,807															
Debt closing costs	$ 100,000															
Debt service reserve fund	$ 300,000															
Capitalized interest	$ 250,000															
Total	$ 5,521,807															

TABLE 8: INVESTMENT DETAILS AND BASIS				
PRECONSTRUCTION COSTS		Basis:		
Design, engineering and procurement	$ 200,000	Engineering estimate		
Permitting	$ 50,000	Engineering estimate		
Electrical Interconnection	$ 50,000	Engineering estimate		
Development management	$ 75,000	Engineering estimate		
Legal	$ 40,000	Engineering estimate		
Financing costs	$ 25,000	Engineering estimate		
Contingency	$ 50,000	Engineering estimate		
Total	$ 490,000			
CONSTRUCTION COSTS				
Anaerobic Digester				Basis:
2 Digesters (200,000 gallons each) installed	400,000	gallons	$ 1,170,000	Aquastore Quote
Feedstock, mixing tank, hydrolysis tank installed	200,000	gallons	$ 585,000	Aquastore Quote
Digestate Storage installed	200,000	gallons	$ 585,000	Aquastore Quote
Feedstock receiving and storage tanks installed	40,000	gallons	$ 55,865	Scaled
Feedstock receiving tanks mixing, screening, pumping equip			$ 189,500	Vendor quotes
4 Rotamix, pumps, mixer systems			$ 296,050	Scaled
Heat exchange equipment			$ 133,961	Scaled
Site work (Excavation, fill, grade, tank install)			$ 250,000	Engineering estimate
Building (for pumps, piping, heat exchange, controls, engine-gen set)	1,800 sf		$ 334,703	Scaled
Laboratory and equipment			$ -	
Tools and work area			$ 1,000	
Back up heat			$ 40,000	Engineering estimate
Mechanical			$ 648,077	Scaled
Electrical			$ 382,385	Scaled
Construction management			$ 250,000	Engineering estimate
Backup Generator				Engineering estimate
Instrumentation and SCADA System			$ 100,000	Engineering estimate
Misc valves, instrument, valves			$ 169,265	Engineering estimate
Contingency			$ 500,000	Engineering estimate
			$ 5,690,807	
Dewatering System				
Digestate solids separation, polymer feed, and ancillaries			$ 170,000	Engineering estimate
Building (Included above)			$ -	
Site work (Included above)			$ -	
Solids storage - roll-off 2 @ $5,500/Unit			$ 11,000	Engineering estimate
Total			$ 181,000	
Renewable Energy System				
1 engine-generator set, sound attenuation radiator, switchgear			$ 200,000	Engineering estimate
motor controls, interconnect $1000/kW (building included above)				
Heat recovery equipment, pumps, and ancillaries			$ 60,000	Engineering estimate
Flare			$ 50,000	Engineering estimate
Total			$ 310,000	
Grants			-	

TABLE 10

Listing of Financial and Technical Assistance Programs

As prepared by Massachusetts Department of Environmental Protection

Project Stage	Sited on Public Property (e.g. state or municipal land, public wastewater treatment facilities)	Agricultural Enterprises
Planning: Site Assessment	DOER GreenComm MassCEC OtE MassDev Brownfield	N/A
Planning: Feasibility Studies	DOER GreenComm MassCEC OtE	USDA RDEP-REAP RD-VAPG
Design Assistance	DOER GreenComm MassCEC OtE	MassCEC OtE
Construction Financing Assistance	DOER GreenComm MassDEP CWSRF RLF SMRP MassCEC OtE MassDev TEF	MassDEP RBDG RLF DAR AgEnergy AEEP MassCEC OtE MassDev TEF USDA FSA NRCS EQIP RD B&I RDEP-REAP
Production-Based Incentives	DOER NMCs RECs/AECs	DOER NMCs RECs/AECs USDA RDEP-ABPP
Project Review (by Local Government Entities)	MassCEC OtE	MassCEC OtE

Key to Acronyms:

MassDEP = Massachusetts Department of Environmental Protection

CWSRF = State Revolving Loan Funds for Clean Water . Provides low-cost funding, via 2% interest loans, to assist municipalities in complying with federal and state water quality requirements. Financial assistance is available for planning and construction of projects which may include anaerobic digestion systems at wastewater treatment plants.

RBDG = Recycling Business Development Grants are available to Massachusetts businesses recycling target materials, one of which is packaged food materials.

RLF = Recycling Loan Fund offers flexible lending programs for working capital, refinancing and real estate acquisition, purchasing of machinery and equipment and acquisition financing with reduced interest rates for projects involved in the collection and processing of organic material.

SMRP = Sustainable Materials Recovery Program provides technical and financial assistance to public and private entities involved in the collection, processing, composting and recovery of organic materials.

DOER = Massachusetts Department of Energy Resources

GreenComm - Grants for Designated Green Communities

NMCs = Net Metering Credits are awarded to a facility that is producing more power than is being consumed at the end of the customer's monthly billing period.

RECs/AECs = Renewable Energy Certificates/Alternative Energy Certificates

DAR = Massachusetts Department of Agricultural Resources

AgEnergy/AEEP = Agricultural Energy Grant Program & Agricultural Environmental Enhancement Program. AgEnergy is a competitive annual energy efficiency and renewable energy grant program available to Massachusetts farms. The scope of funding priorities varies year to year, focusing on efficiency and renewable technologies. In the past the program has funded feasibility studies, anaerobic digestion engineering documents and design and construction cost needs. Typical maximum funding amount is $30,000. AEEP is a competitive annual environmental grant program that supports the mitigation and/or prevention of negative impacts to natural resources and water quality that may result from agricultural practices. In the past, AEEP has funded components of ADs as a manure management strategy. Typical maximum funding amount is $30,000 for materials only with a minimum 5% cost share.

MassCEC = Massachusetts Clean Energy Center

OtE = MassCEC Commonwealth Organics-to-Energy
Program currently offers technical assistance grants (for public entities only), as well as design and construction grant opportunities for public and private entities.

MassDev = MassDevelopment

Brownfield = Brownfields Redevelopment Fund provides loans (and sometimes grants for municipalities) of up to $100,000 for Phase I site assessment for brownfield sites.

TEF = Tax Exempt Financing that lowers debt costs by between 1% and 2% for qualifying solid waste disposal facility, district energy system and small manufacturing projects.

USDA = United States Department of Agriculture

FSA = Farm Service Agency Loan & Loan Guarantee Programs. FSA makes direct and guaranteed farm ownership and operating loans to family-size farmers and ranchers who cannot obtain commercial credit from a bank, Farm Credit System institution, or other lender. FSA loans can be used to purchase land, livestock, equipment, feed, seed, and supplies. FSA loans can also be used to construct buildings or make farm improvements.

NRCS-EQIP = Natural Resources Conservation Service Environmental Quality Incentives Program. USDA NRCS is working to help farmers with conservation practices that improve air quality. Depending on federal appropriations, NRCS has been able to provide eligible producers with support through the Environmental Quality Incentives Program (EQIP) to implement cost effective and innovative practices that improve air quality, including anaerobic digesters. Funds are available in areas with air quality that does not meet the health-based standards established for ground-level ozone pollution. This currently includes all counties in Massachusetts.

RD B&I = Rural Development Building & Industry Loan Guaranty Program. This USDA program is designed to encourage the commercial financing of rural businesses, thereby creating and saving rural jobs and improving the economic and environmental climate of rural communities. The Business & Industry Loan program is lender-driven. The USDA guarantees the loan rather than lending directly. A commercial lender requests the B & I guarantee, and, if approved, it makes and services the loan.

RDEP = Rural Development Energy Program. Availability depends upon annual federal appropriations.

REAP = Rural Energy for America Program. REAP provides assistance to agricultural producers and rural small businesses to complete a variety of projects. Offering both loan guarantees and grants, the REAP program helps eligible applicants install renewable energy systems such as solar panels or anaerobic digesters, make energy efficiency improvements such as installing irrigation pumps or replacing ventilation systems, and conduct energy audits and feasibility studies.

ABPP = Advanced Biofuel Payment Program. ABPP provides payments to producers who support and expand production of advanced biofuels refined from sources other than corn kernel starch. To be eligible, applicants must produce and sell advanced biofuels. Conditions need to be met for the producer and for the biofuel.

RD VAPG = Rural Development Value-Added Producer Grants. Awards may be used for planning activities, as working capital for marketing value-added agricultural products, and for farm-based renewable energy. Eligible applicants are independent producers, farmer and rancher cooperatives, agricultural producer groups, and majority-controlled producer-based business ventures.

APPENDIX 2

Owner – Designer Agreement

20-13 DESIGNER CONTRACT FOR THE ANAEROBIC DIGESTERS PROJECT

GREENFIELD WASTEWATER TREATMENT FACILITY

APRIL 2020

CITY OF GREENFIELD

Architectural Schematic Design & Consulting Services for the Anaerobic Digesters – Greenfield WWTP

Located at 384 Deerfield Street, Greenfield, MA

This agreement is made under seal the _____ In the year 2020 between the City of Greenfield (hereinafter the Owner) and _____ acting as ARCHITECT – ENGINEER (hereinafter the Designer).

The Owner's Project Manager under this contract is:

Name Neil Joyce, Principal, Construction Monitoring Services, Inc.

Address 270 Main Street, Marlborough, MA 01752

Telephone (508) 786-0600 Fax(508) 786-0608

The Designer's Designated Representative under this contract is:

Name: _____ Position/Title:_____

Address: _____

Telephone _____

Email: _____

City Mailing Address:
City of Greenfield
Procurement Office
14 Court Square
Greenfield, MA 01301

TABLE OF CONTENTS

ARTICLE 1: DEFINITION OF TERMS

1. GENERAL LAWS –the General Laws of the Commonwealth as amended including any rules, regulations and administrative procedures implementing said laws.

2. PROJECT – the Project, which may involve one or several construction contracts, which is numbered and entitled, and the location of which is described on page one.

3. OWNER'S PROJECT MANAGER (OPM) – the individual identified on page one, who is authorized to act on the Owner's behalf with respect to the Project.

4. DESIGNER'S DESIGNATED REPRESENTATIVE – the individual identified on page one, who is authorized to act on the Designer's behalf with respect to the Project.

5. PRINCIPALS – the Designer's registered Architects or Engineers listed in Article 26.

6. APPROVAL OF THE OWNER – a written communication from the Owner's Project Manager to the Designer expressing the Owner's approval of services or documents prepared by the Designer, which communication in no way relieves the Designer from responsibility under this contract.

7. NOTICE TO PROCEED – a written communication from the Owner's Project Manager, which constitutes an essential condition of this contract, authorizing the Designer to perform the services for the Project phase to which such notice shall relate. The Notice to Proceed shall include the basis for compensation for the services and may include the time for submittal. Subsequent written communications amending the Notice to Proceed are required to change either the basis for compensation or a submittal date.

8. SUBMITTAL DATES – those dates referred to in the Notice to Proceed or any subsequent amendment thereto.

9. CONSTRUCTION CONTRACT – contract for construction of a whole or part of the Project including all documents incorporated by reference, modifications, and change orders.

10. TOTAL CONSTRUCTION COST – the sum of (1) the actual construction contract award price and (2) each authorized change order, which revises the construction contract award price.

11. RECORD DRAWINGS – record drawings shall consist of all the contract drawings.

12. AGENTS OF THE OWNER – the Owner's Schematic Design Committee or Building Committee.

ARTICLE 2: PROJECT BUDGET AND TIME PARAMETERS

1. The Owner's total budget for the Project including the Designer's

   compensation is _____

2. The Owner's budget for the total construction costs, excluding the Designer and OPM compensation is $ _____

3. The Owner's schedule for the Project calls for the following milestones to be met by the specified dates: (**To Be Determined**)

Milestone	Date
Final Schematic Design	_____
Final Design Option/Construction Cost	_____
Design Development	_____
90% Construction Documents for Facilities Review	_____
100% Contract Documents Complete	_____
Construction Bids Due	_____
Construction Contract Award	_____
Operational Digesters / Completion of Work	_____

ARTICLE 3: KEY PERSONNEL

The Designer represents that the key individuals named below in this section will be assigned to the performance of the Designer's obligations under this contract.

NAME AND TITLE

_____ _____ _____ _____

_____ _____ _____ _____

The services of each named individual shall be required unless the individual becomes unavailable for one of the following reasons: death, disability, or termination of the underlying employment relationship.

Whenever practicable, the Designer shall provide the Owner with a minimum of thirty (30) days written notice before a key individual named in this section becomes unavailable.

If a key individual named in this section becomes unavailable for any of the above reasons the

Designer shall give the Owner's Project Manager the resume of a proposed replacement.
The Owner shall have the right to require the Designer to remove any key individual from his or her assignment to this contract for cause. The key individual shall receive reasonable notice of any such action.

ARTICLE 4: RESPONSIBILITIES OF THE OWNER

1. The Owner shall, without unreasonable delay, render all approvals required by this contract in writing to the Designer, or shall notify the Designer in writing why such approvals are being withheld. The Owner shall not unreasonably withhold any approval, acceptance, or consent required under this contract.
2. For satisfactory performance of all services required in this contract, the Owner shall compensate the Designer in accordance with the provisions of Articles 12 through 16.
3. The Owner shall furnish to the Designer available surveys of the Project's building site, or sites, showing the grade and lines of streets, pavements and adjoining properties; the rights, restrictions, easements, boundaries and contours of the site, or sites; reports from any boring, test pits, chemical, mechanical or other tests, any photographs and information as to water, sewer, electricity, steam, gas, telephone and other services, and data and drawings regarding existing buildings. All such data and any other data provided by the Owner shall remain the property of the Owner. The Designer may use all data provided by the Owner only for the purposes of this Contract, unless the Owner gives the Designer specific written permission for some other use.
4. The Owner does not guarantee nor does it make any express or implied warranties concerning the accuracy of information. The Designer shall, within the basic fee, analyze and evaluate the information furnished by the Owner. However, the Designer will not be responsible for the accuracy or completeness of such information.
5. If data of the type identified in paragraph 3 are not available or are in the opinion of the Designer insufficient, the Designer, upon request, may be given authorization to obtain the services of a consultant to perform the work, in which case the Designer shall be reimbursed in accordance with Article 14, or to perform the work with his or her own employees, in which case the Designer shall be compensated in accordance with Article 13. In no case shall the Designer commence such work without prior written authorization of the Owner's Project Manager.
6. The Owner shall furnish all legal, accounting and insurance counseling services as may be necessary at any time for the Project, including such accounting services as the Owner may require to verify the Contractor's Application for Payment and such legal services as the Owner may require or the Architect may reasonably request with regard to legal issues

raised by the Contractor or to the applicability or legal interpretation of government laws and regulations.

ARTICLE 5: PROFESSIONAL RESPONSIBILITY AND SERVICES TO BE PERFORMED UNDER THE BASIC FEE

1. The Designer shall perform professional services in accordance with the scope of services set forth in Schedule I & the attached RFP. If Schedule I & the attached RFP do not identify asbestos or hazardous material abatement design services within the scope of work the Designer shall have no responsibility for any asbestos or hazardous material-related design or contract administration services. The Designer shall be responsible for the professional and technical accuracy and the coordination of all designs, drawings, specifications, estimates, and other work furnished by him or his consultants and subcontractors. The Designer shall endeavor to staff his office with sufficient personnel to complete the services required under this contract in a continuous and expeditious manner, and shall meet the approved schedule and submittal dates established during the course of this contract.

2. The Designer shall furnish appropriate competent professional services for each of the phases to the point where detail checking or reviewing by the Owner will not be necessary. Any changes, corrections, additions, or deletions made by the Owner shall be incorporated into the design of the Project prior to the completion of Design Development Phase. The Designer, with the written approval of the Owner's Project Manager, which shall not be unreasonably withheld, shall propose for Owner's approval materials, equipment, component systems and types of construction to be included in the design of the Project.

3. The Designer shall thoroughly acquaint his employees and consultants with the provisions of General Laws Chapter 30, Section 39M, which provides in part: "for each item of material the specification shall provide for either a minimum of three named brands of materials or description of material which can be met by a minimum of three manufacturers or producers, and for the equal of any one of said named or described materials. The Owner may have requirements for proprietary specifications for certain materials or equipment, and as such, the Designer shall acquaint his employees and consultants with the specification requirements to accommodate such requirement.

4. The Owner's review, approval or acceptance of, or payment for, any of the services furnished shall not be construed as a waiver of any rights under the contract or of any cause of action arising out of the performance of the contract.

5. The Designer shall perform the following specific tasks in the following phases:

The Following Phases are for the selected Architect chosen for the Design and Construction services: (This section may be modified by the City at a later date)

PHASE 1: FINAL SCHMATIC DESIGN:

The Designer shall meet with the Building Committee on a regular basis to obtain input and review the progress of the design. The Designer and its consultant team shall revise the Schematic Design previously prepared for submission to the City of Greenfield, and based on input from the Building Committee.

Once a schematic design has been approved the Designer will engage an independent professional cost estimator to prepare an estimate of Probable Construction Cost.

The Designer will work with the Owner Project Manager to establish an updated Project Budget

PHASE 2: DESIGN DEVELOPMENT:

Following approval of the Schematic Design the designer will meet with the Project Team and/or Building Committee at regular intervals to review the progress of the design.

The Designer and its consultant team will develop the design in greater detail identifying proposed materials and developing technical details of structural, mechanical, electrical, plumbing and fire protection systems.

Once a design development documents have been approved the Designer will engage an independent professional cost estimator to prepare an updated estimate of Probable Construction Cost.

The Designer will work with the Owner Project Manager to establish an updated Project Budget

Phase 3: CONSTRUCTION DOCUMENTS

The Designer and its Consultant Team will develop drawings and specifications in sufficient detail to bid the project under Mass General Law Chapter 149.

When the Construction Documents are 75% complete the Designer will engage an independent professional cost estimator to prepare an updated estimate of Probable Construction Cost.

The Designer will work with the Owner Project Manager to establish an updated Project Budget

Phase 4: BIDDING

The Designer will assist the City of Greenfield in bidding the project under Massachusetts

General Law Chapter 149

PHASE 5: CONSTRUCTION ADMINISTRATION:

A. After receipt of authorization from the City of Greenfield, the Designer and his consultants shall;
   1. Be charged with general administration of the construction contract;
   2. Review and take appropriate action on samples, schedules, shop drawings and other submissions by the General Contractor;
   3. Not less than weekly, visit the site of the Project and observe the progress of the work and conduct job meetings and take minutes of the meetings, maintain and review RFI, shop drawing submittals and C.O.P logs and distribute to all attendees;
   4. Report to the Owner at least weekly in writing on the progress of construction including whether or not the Contractor is keeping record drawings updated;
   5. On a weekly basis, make specific recommendations on condemnation of all Project work observed by the Designer which fails to conform to the construction drawings and specifications, and re-inspect corrected work;
   6. Require each consultant employed in accordance with Article 6 to make visits during the appropriate stage of construction, such appropriateness as mutually agreed between the Owner and Designer, during the progress of that portion of the said construction to which the consultant's services relate, and report in writing to the owner;
   7. In a timely manner, decide all questions regarding interpretation of or compliance with the construction drawings and specifications, except as the Owner's Project Manager may in writing otherwise determine;
   8. Require the General Contractor to provide as built record drawings; and
   9. Designer shall attend job meetings/site visits on a weekly basis;
   10. Designer shall attend meetings with the City and/or Building Committee upon request.

B. The Designer shall submit to the Owner in a timely manner, all requisitions for payment submitted by the General Contractor. With respect to each such requisition, the Designer shall certify to the best of his knowledge that the percentage of work included in the requisition is accurate and the work performed conforms to the construction drawings and specifications. In the event the Designer does not approve the requisition exactly as submitted by the General Contractor, the Designer shall forward it for payment to the Owner dated but unsigned with an accompany letter of explanation setting forth objections and recommended changes. The Designer shall coordinate the required weekly visit to the construction site in such a manner as to be able to return to his office with the contractor's monthly requisition for payment bearing the Clerk-of-the-Works' approval or letter of exception. Timely payments to the contractor are required by General Law Chapter 30,

section 39K; therefore, the Designer shall establish office procedures to process requisitions for payment in a timely manner.

C. Before examining the requisition for final payment submitted to the Owner by the General Contractor and making and certification in response thereto, the Designer shall obtain from the General Contractor record drawings, including drawings showing the actual installation of the site utilities, plumbing, heating, ventilating and electrical work under the construction contract, and recording all changes. The Designer shall ascertain by his review that changes authorized by Change Orders are shown on the contractor's record drawings. Should the Designer find that the record drawings do not show such actual installation, the Designer shall return the record documents to the Contractor for corrections. At the conclusion of the construction contract, the Designer shall submit to the Owner an evaluation of the performance of the General Contractor, in the form prescribed by the Owner.

D. Two suitably bound legible copies of all original design and quantity calculations, including those pertinent to change orders and shop drawings if applicable, shall be furnished by the Designer to the Owner at the conclusion of the construction contract.

E. The Architect shall not have control over or charge of and shall not be responsible for construction means, methods, techniques, sequences or procedures or for safety precautions or programs in connection with the Work, since these are solely the Contractor's responsibility.

F. Architect shall review and approve the Contractor's close-out log, which shall be used by Architect, Contractor and Owner's Project Manager to ascertain completion of close-out activities.

ARTICLE 5.5: PROJECT PERMITTING AND APPROVALS

1. The Designer warrants that his design will conform with applicable federal, state, and local laws, regulations, ordinances, and by-laws.
2. The Designer shall provide the Contractor with a list of applicable federal, state, and local permits and approvals required to implement his design at the site as soon as possible during design development and shall regularly update such list during the period of contract performance.
3. The Designer shall provide the Owner with written certification that applicable federal, state, and local permits and approvals required to implement the design at the site provided by the Contractor have been obtained when the Designer submits construction documents to the Owner.

ARTICLE 6: CONSULTANTS, SUBCONSULTANTS, SUCCESSORS AND ASSIGNMENTS

1. The Designer shall not employ consultants except Key Personnel designated in ARTICLE 3, or assign or transfer any part of his services or obligations under this Agreement without the prior written consent of the Owner. The Owner may rescind its consent if in the Owner's sole judgment a consultant or sub consultant is incompetent, irresponsible, or otherwise unsatisfactory, and the Designer shall remove such consultant or sub consultant from the work upon the Owner's rescission of its consent. The Owner's written consent shall not in any way relieve the Designer from his responsibility for the professional and technical accuracy and the coordination of all data, designs, drawings specifications, estimates and other work or materials furnished or other responsibilities under this Agreement.
2. The Designer shall employ the following consultants within the basic fee for this project: Structural Engineer, Electrical Engineer, Mechanical Engineer, Plumbing and Fire protection Engineer, Civil Engineer, Landscape Architect, Geotechnical Consultants, Hazardous Materials Consultants, Cost Estimator, and FF&E Designer. Consultants must be registered or certified in their respective disciplines if the applicable General Laws require registration or certification.
3. It is expressly understood and agreed that Designer shall at all times during the term of this Contract act as an independent contractor, and shall not have any authority to bind the City. Designer and consultant's employees, agents and/or subconsultants shall not be deemed to be employees or agents of the City. Further, nothing contained herein shall be construed to create a joint venture, partnership, association or other affiliation between the Designer and the City.
4. When the Designer receives payment from the Owner, the Designer shall within 14 calendar days make payment to each consultant whose work was included in the work for which such payment was received from the Owner. The Owner shall have the contractual right to investigate any breach of a consultant's contract and to take corrective measures necessary for the best interest of the Owner.
5. The Designer may not employ in any element of design, specification, estimating or other work under this contract any person or firm that expects to be a bidder or supplier for the construction of the Project or any part thereof.

ARTICLE 7: SPECIAL CONSULTANT'S SERVICES

1. The Designer shall work with the Owner's Project Manager to document the progress of construction.

2. The Designer shall work with the Owner's Project Manager to identify the requirements for services from a qualified testing laboratory.
3. Consultant fee proposals shall be received by the Designer and accompanied by recommendations of approval submitted to the Owner's Project Manager before any work is authorized. Each such consultant whose fee for such services exceeds $25,000 shall carry Liability Insurance in an amount not less than his fee and said liability insurance shall name the Owner as an additional insured. Any such consultant shall provide the Owner with a minimum of thirty (30) days notice prior to cancellation of his Liability Insurance.
4. The cost for the above services or any approved special consultant not listed in ARTICLE 3, or in ARTICLE 6, shall be reimbursed as provided in ARTICLE 14.

ARTICLE 8: TIME RECORDS

a. The Designer shall cause to be maintained complete, accurate and detailed records of all time devoted to the Project by the Designer and each consultant or subcontractor employed by the Designer. The Owner may at all reasonable times audit such records. The Designer shall maintain accurate and detailed accounts for a six-year period after the final payment in accordance with General Laws Chapter 30, section 39R (b) (1). Further, until the expiration of six (6) years after final payment, the office of inspector general and the commissioner of capital asset management and maintenance shall have the right to examine any books, documents, papers or records of the Designer or of his subcontractors that directly pertain to, and involve transactions relating to, the Designer or his subcontractors. In addition, in contracts where the total design fee exceeds $10,000 or which are for the design of a building for which the budgeted or estimated construction cost exceeds $100,000.00, the Designer shall comply with the following provisions of General Laws Chapter 30, section 39 R which require the Designer to:
b. file an annual audited financial statement per M.G.L. c. 30, Section 39R(d)
c. submit a statement from an independent certified public accountant that such CPA has examined management's internal accounting controls and are consistent with the results of management's evaluation of system controls and such representations are reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the Designer's financial statements.

ARTICLE 9: COMPLIANCE WITH LAWS

The Designer shall exercise due care in accordance with generally accepted standards of professional practice under similar circumstances by competent members of the design profession practicing in this locality, to perform the work required under this contract in conformity with all applicable laws of the Commonwealth of Massachusetts, its political

subdivisions and Federal Government. Only to the extent the Designer is found liable, the Designer shall promptly pay all fines, penalties and damages that may arise out of or are imposed because of the Designer's failure to comply with the provisions of this Article and shall indemnify the Owner against any and all liability incurred as a result of a violation of this section.

ARTICLE 10: PROJECT SUPPORT PERSONNEL

In special circumstances, approved in writing by the Owner's Project Manager, it may be necessary for the Designer to employ on-site personnel. The Designer shall be reimbursed 2.0 times the Direct Personnel Expense (DPE) of such on-site personnel.

ARTICLE 11: RECORD DRAWINGS, REPORTS, CALCULATIONS

The Owner shall have unlimited rights, for the benefit of the Owner, in all programs, drawings, designs, and specifications, developed in the performance of this contract, including the right to use same on any other Projects without additional cost to the Owner for use on this Project, for reference in connection with Owner's use, maintenance or occupancy of this Project, or for additions or renovations to this Project; and with respect thereto the Designer agrees and hereby grants to the Owner an irrevocable royalty-free license to all such programs, drawings, designs and specifications which he may cover by copyright and to all designs as to which he may assert any rights or establish any claim under any patent or copyright laws. The Designer shall not be responsible for changes made in the documents without the Designer's authorization, nor for the Owner's use of the documents on Projects other than the Project.

ARTICLE 12: DESIGNER'S BASIC FEE

1. For the performance of all services required in this contract and excluding those services specified under ARTICLES 13, 14, and 15, the Designer shall be compensated by the Owner in accordance with the lump sum fee as designated in the Notice to Proceed and determined in accordance with: a negotiated lump sum fee. If there is a substantial change in the scope of services provided in this contract, the Designer and the Owner's Project Manager will agree to an adjustment in the Designer's Basic Fee. Delay of three months or more by the Owner or a significant change in the total construction cost of the Project will be considered a substantial change in scope of services.

2. Payment of the (not to exceed) design fee shall be made in accordance with ARTICLE 16:

Final Schematic Design	$ _____
Design Development	$ _____
Construction Documents	$ _____
Bidding	$ _____
Construction Administration	$ _____
Total Basic Fee	**$**

The Owner may elect to engage the services of the Designer to provide the following

additional services:

LEED Submission	$ _____
Furnishing Selection & Procurement	$ _____

ARTICLE 13: EXTRA COMPENSATION

1. With the prior written approval of the Owner's Project Manager, the Designer shall perform all or any of the following services in addition to the services performed pursuant to other provisions of this contract: (1) revising previously approved drawings, specifications or other documents to accomplish changes authorized by the Owner, except for changes occasioned by the Designer's errors or omissions and except for changes at the bidding phase to reduce the overall cost of the project; (2) preparing documents for alternate bids requested by the Owner except alternates prepared by the Designer to adjust the total construction cost; (3) providing consultation concerning replacement of any work damaged by fire or other cause during construction and furnishing professional services of the type set forth in ARTICLE 5 as may be required in connection with the replacement of such work; (4) providing professional services made necessary by the default of the contractor or by failure of performance or by major defects or deficiencies in the Work of the Contractor, in the performance of the construction contract; the designer shall insure the proper wording is included in the specification stating the contractor is liable for designer fees in relation to failure of performance by the general contractor or his/her subcontractors (5) providing services after final payment to the contractor, except for services occasioned by the Designer's errors or omissions; (6) preparing special documents for or appearing as a witness in change order appeal hearings under General Laws Chapter 30, section 39Q or in judicial litigation arising out of the construction contract, except for such services occasioned by the Designer's error or omissions (7) preparing change orders and supporting data, except as set forth in ARTICLE 15; (8) revising construction documents submitted in their final and complete form for which bids were not received within three months after submission; and (9) making studies other than those normally required and preparing applications and reports to assist the Owner in obtaining federal aid; (10) observing the setting and adjustment of automatic controls; (11) evaluating substitutions by Contractor and making subsequent revisions to drawings, specifications or other documents; however minor substitutions not requiring extensive review, re-engineering, re-calculation or revisions to drawings, specifications or other documents will be evaluated by the Designer as part of the Basic Services; (12) preparing measured drawings of the existing facility; (13) providing services after issuance to the Owner of the Final Certificate for Payment or in the absence of a Final Certificate for Payment, more than 60 days after the scheduled date of substantial completion of the Work, except if the Designer is found liable for such delay to the scheduled date of substantial completion; (14) providing services associated with frequent or repeated or unusual instances of non-conforming work which arise from lack of supervision by the Contractor; (15) reviewing shop drawings, product data, samples and other similar submittals more than two times: once upon original submission and a second time if

revisions or corrections are requested by the Architect. The Architect shall be reimbursed for review of such after the second time.

2. For the services provided pursuant to paragraph 1 of this ARTICLE, the Designer shall be compensated by the Owner 2.0 times the Direct Personnel Expense (DPE) of technical personnel including listed key personnel. The Designer and his consultants shall complete a Certification Statement stating the standard hourly rate charged for principals and a copy of that statement, as approved by the Owner, and revised from time to time, is incorporated into this contract. The Owner shall have the right to require the Designer or his consultants to provide the Owner certified payroll statements from other current design contracts in order to verify the rate stated in the Certification Statement. On-site support personnel approved pursuant to ARTICLE 10 are not compensable under this paragraph.
3. Upon submission by the Designer of evidence satisfactory to the Owner that additional expenses are being incurred beyond the amount realized on a fee basis, the Owner's Project Manager may authorize extra compensation on the basis of actual cost plus overhead, but not profit and without a (2.0) times of technical personnel including listed key personnel for additional services rendered under Phase 4, after the originally scheduled construction completion time as extended by authorized additional work change orders has been exceeded by the earlier of more than twenty-five (25%) percent or sixty (60) days through no fault of the Designer. This shall only be applicable when the Designer shall have submitted under Article 5 (c) (Phase 3) a detailed analysis or description of how the Designer arrived at the estimated number of calendar days for completion of construction.

ARTICLE 14: REIMBURSABLE EXPENSES

1. The Designer shall be reimbursed by the Owner:
    a. The actual cost to the Designer of special consultants, not specified in ARTICLE 3, in ARTICLE 6, or in Schedule I, and approved in writing by the Owner's Project Manager, provided, however, that no reimbursement for such expense shall be made unless the rates of compensation for said consultant services shall have been previously approved in writing by the Owner's Project Manager. The Owner's Project Manager may approve a lump sum fee.
    b. Other actual costs, including special printing, but only when specifically authorized in writing by the Owner's Project Manager.
    c. For document copies more than numbers specified in the contract if requested by the Owner.
    d. Electronic distribution of bid documents, and or on-line bidding services shall be a reimbursable expense. The price shall be confirmed and approved by with the Owner's Project Manager and the Owner.
2. The Owner shall not reimburse the Designer for travel expense under this contract, provided, however, that in special circumstances and with prior written approval

from the Owner's Project Manager, the Designer may be reimbursed for out-of-state travel expenses beyond 150 miles consistent with applicable statutes, rules, and regulations.

3. The Owner shall not reimburse the Designer for any telephone or other out-of-pocket expense unless specifically authorized as provided above.
4. For coordination, inspection, analysis, and evaluation of and for the assumption of responsibility for services authorized under paragraphs (a), (b), (c) and (d) above, the Designer shall be paid 10% of the actual expense. The tax exemption number assigned to the Owner as an exempt purchaser to extent that materials and supplies are used on incorporated in the performance of this contract is: 046-001-163.

ARTICLE 15: DESIGN FEE AND RESPONSIBILITY FOR MODIFICATIONS AND CHANGE ORDERS

1. The Designer shall be compensated in accordance with the rates specified in ARTICLE 13, for the services of its employees or any Consultant listed in ARTICLE 3, ARTICLE 6, or in the attached RFP for the preparation of modifications, change orders and supporting data. Neither the Designer nor his consultants shall be compensated for any services involved in preparing changes that are required for additional work that were occasioned by the Designer's errors or omissions, as reasonably determined by the Owner. The Designer shall not be compensated for any services involved in preparing changes required to make unit price adjustments due to existing conditions, nor for services involved in change orders for time extensions only. Changes for which the Designer receives no compensation under this ARTICLE shall be called "no fee modifications" or "no fee change orders." The fact that the Designer receives no fee shall not limit the Owner's legal remedies regarding such changes.
2. Payments to the Designer for modifications or change orders shall be made upon completion of the contractor's work under such modifications or change orders.

ARTICLE 16: METHOD OF PAYMENT TO THE DESIGNER

Payments for this Contract shall be paid in accordance with SCHEDULE II, which is hereto attached.

1. Except as the Owner may otherwise authorize upon written request of the Designer, the compensation payable under ARTICLE 12 above, for performance of all services specified in ARTICLE 5, shall be paid to the Designer by the Owner monthly for the proportion of work completed, not to exceed the amounts listed in schedule III.

ARTICLE 17: FORCE MAJEURE

1. The Contract shall be subject to Force Majeure considerations. Either party hereto shall be excused from performance of any act under the contract if prevented from the performance of any act required by reasons of strikes, lockouts, labor trouble, failure of

power, fire, winds, Acts of God, riots, insurrections, war or other reason of a like nature not reasonably within the control of the party. The period for the performance of such obligation shall be extended for an equivalent period for no additional cost. In the event that the extension is not possible, the Designer may be required to rebate to the City a portion of the fee.

It is agreed, however, that since performance dates of this Contract are important to the implementation of requested services, continued failure to perform for periods aggregating thirty (30) or more days, even for causes beyond the control of the Designer, shall be deemed to render performance impossible, and the City shall thereafter have the right to terminate this Contract in accordance with the provisions of the section entitled "Termination of Contract."

ARTICLE 18: TERMINATION OF CONTRACT

1. By written notice to the Designer, the Owner may terminate this contract in whole or in part at any time either for the Owner's convenience or because of the failure of the Designer to fulfill his contract obligations. If any such termination shall occur without the fault of the Designer, all compensation and reimbursement due to the Designer up to the date of termination, in accordance with all contract terms, including proportionate payment for partially completed work, including the actual cost of such termination of services shall be paid to the Designer by the Owner. Such payment shall not exceed the fair value of the work, as the Owner shall determine. No amount shall be allowed for anticipated profit on unperformed services.

2. If the contract is terminated due to the failure to the Designer to fulfill his/her contract obligations, the Owner may take over the work and prosecute the same to completion of contract or otherwise. In such cases, the Designer shall be liable to the Owner for any additional cost occasioned to the Owner thereby. These rights and remedies of the Owner are in addition to any rights and remedies provided by law or under this contract.

3. Upon any termination of the contract, the Designer shall deliver to the Owner copies of all records, programs, data, drawings, specifications, reports, estimates, summaries, and such other information and materials, whether completed or in process, as may have been accumulated by the Designer in performing this contract.

4. Subject to the provisions explaining Force Majeure, if the Designer shall fail to fulfill in a timely and satisfactory manner its obligations under this Contract, or if the Designer shall violate any of the covenants, conditions, or stipulations of this Contract, which failure or violation shall continue for seven (7) days after written notice of such failure or violation is received by the Designer, then the Owner shall thereupon have the right to terminate this Contract by giving written notice to the

Designer of such termination and specifying the effective date thereof, at least seven (7) days before the effective date of such termination.

5. The Mayor, by written notice, may terminate this contract, in whole or in part, when it is in the City's best interest. If this contract is terminated, the municipality shall be liable only for payment under the payment provisions of this contract for services rendered before the effective date of termination.

ARTICLE 19: RELEASE AND DISCHARGE

The acceptance by the Designer of the last payment for services paid under the provisions of the contract and/or in the event of termination of the contract, shall in each instance, operate as and be a release to the City and every member and agent thereof, from all claims and liability to the Designer for everything done or furnished for or relating to the work, or for any act or neglect of the City or of any person relating to or affecting the work and except that such acceptance shall not release the City from any liability it would otherwise have for injuries to third parties resulting from the negligent acts or omissions of the City or its employees.

ARTICLE 20: NOTICES, APPROVALS, INVOICES

1. Any notice required under this contract to be given by the Owner to the Designer, or by the Designer to the Owner shall be deemed to have been so given, whether or not received, if mailed by prepaid postage by, respectively, the Owner to the Designer at the address specified for the Designer on Page 2 above, or the Designer to the Owner at the address specified for the Owner on Page 2.
2. All invoices except for those made under the provisions of ARTICLE 13 may be submitted monthly and will be promptly processed by the Owner if they are in conformity with the contract terms and properly documented; if not they will be returned to the Designer.
3. Invoices submitted for services not included as part of the Basic Fee and which have not been previously authorized in writing, shall be returned to the Designer.
4. Invoices for services under ARTICLES 13, 14, and 15 shall be accompanied by a complete breakdown listing the name, payroll title, date, number of hours each day, hourly rate and extended amount.
5. Requests for previously authorized expenses of any nature must be accompanied by a billing/receipt from the source of the expense, unless compensation for additional services is based upon a stipulated sum approved in writing by the Owner Project Manager.

ARTICLE 21: INSURANCE

1. General Requirements

(a) The Designer shall, before commencing performance of the contract, be responsible for providing and maintaining insurance coverage in force for the life of the contract of the kind and in adequate amounts to secure all of the obligations under the contract and with insurance companies acceptable to the City of Greenfield. All such insurance carried should not be less than the kinds and amounts designated herein, and the Designer agrees that the stipulation herein of the kinds and limits of coverage shall in no way limit the liability of the Designer to any such kinds and amounts of insurance coverage.

(b) With the exception of Professional Services Liability for architects, designers and engineers, and Worker's Compensation, the City of Greenfield must be named as an additional insured. A certificate of insurance will be provided evidencing the existence of each insurance policy required by this contract and the inclusion of the City as an additional insured for each applicable policy. Upon execution of the contract the Designer will provide copies of certificates of insurance to the City of Greenfield, Procurement & Risk Management. The City reserves the right to request certified copies of any of the insurance policies required by this contract, which shall be provided to the City promptly.

(c) Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of this contract, and shall constitute sufficient grounds for immediate termination of the same. All insurance maintained as provided for in the above shall be obtained and maintained at the sole expense of the Designer. Annually, at time of Designer's policy renewal, updated insurance certificates shall be sent to the City of Greenfield, Procurement Office, 14 Court Square, Greenfield, MA 01301.

(d) No cancellations of such insurance, whether by the insurer or by the insured party shall be valid unless written notice thereof is given by the parties proposing cancellation to the other party and to the City of Greenfield at least thirty (30) days prior to the intended effective date thereof, which date shall be expressed in said notice, and which shall be sent out by registered mail, return receipt requested. These provisions shall apply to the legal representatives, trustees in bankruptcy, receiver, assignee, and/or the successor in interest of the Designer.

(e) All insurance coverage shall be placed with such company as may be acceptable to the City of Greenfield and shall constitute a material part of the contract documents.

2. Commercial General Liability Insurance

The designer shall at his own expense obtain and maintain the following insurance coverage:

Commercial General Liability with policy limits of not less than one million dollars ($1,000,000) for each occurrence and two million dollars ($2,000,000) in the aggregate for bodily injury and damages to or destruction of property.

3. Automobile Liability and Property Damage Insurance

   Automobile Liability covering vehicles owned and non-owned vehicles used, by the Designer with policy limits of not less than one million dollars ($1,000,000) per accident for bodily injury, death of any person, and property damage arising out of the ownership maintenance and use of those motor vehicles along with any other statutorily required automobile coverage to cover contracted employees of the awarded Designer.

4. Workers' Compensation Insurance

   The Designer shall carry Workers' Compensation Insurance as required by Massachusetts General Law, c. 152, and Section 25, with a minimum limit of Employer's Liability as per Massachusetts General Law requirements.

5. Excess Liability Insurance

   The Designer shall carry excess liability insurance of not less than One Million Dollars ($1,000,000.00) covering over general liability, automobile, and worker's compensation insurance.

6. Professional Services Liability/Errors and Omissions Insurance

   (a) The firm/individual shall also carry Comprehensive Professional Services Liability/Errors and omissions insurance coverage in an amount no less than Two Million Dollars ($2,000,000.00) per claim and Three Million Dollars ($3,000,000.00) per claim and Three Million Dollars ($3,000,000.00) in the aggregate. Subject to the approval of the City, the Designer may have a professional liability policy with a deductible clause if, in the judgment of the City, the Designer's financial resources are sufficient to directly absorb the possible expense without assistance.

   (b) The coverage shall be in force from the time of the Contract to the date when all contracted work being performed under the contract is completed and accepted by the City. The Designer shall provide the Owner with a Certificate of Insurance documenting required coverage. And provide documentation of renewal on an annual basis. The Designer shall notify the City should the coverage become unavailable.

7. Other Liability (as may be necessary)

   The aforementioned insurance coverage's shall remain in full force and effect throughout the period of the contract. Similar insurance coverage shall be provided by or in behalf of any subconsultant to cover their operations with the same minimum limits as required of the Designer. Designer's insurance shall be primary insurance to all insurance carried by Owner.

8. Certificates and any and all renewals substantiating that required insurance coverage is in effect shall be filed with the contract. Any cancellation of insurance whether by the insurers or by the insured shall not be valid unless written notice thereof is given by the party proposing cancellation to the other party and to the Owner's Project Manager at least fifteen days prior to the intended effective date thereof, which date should be expressed in said notice or for any other purpose. The Designer or the Designer's insurer shall indemnify, and hold harmless the Owner and all of its officers, agents, and employees against all suits and claims of liability of every name and nature, for or on account of any injuries to persons or damage to property to the extent that the same is the result of the negligence of the Designer in the performance of the work covered by this agreement and/or of failure to comply with the terms and conditions of this agreement, whether by himself or his employees or subcontractors, provided the Designer is notified of any claim within a reasonable time after the Owner becomes aware of it, is afforded an opportunity to participate in the defense of the claim, and is afforded an opportunity to disapprove any negotiated settlement of such claim.

ARTICLE 22: INDEMNIFICATION

To the fullest extent permitted by law, the Designer shall indemnify and save harmless the City and all of the City's officers, agents and employees from and against all suits and claims of liability of every name and nature, including attorney's fees and costs of defending any action or claim, for or on account of any claim, loss, liability or injuries to persons or damage to property of the City or any person, firm, corporation or association arising out of or resulting from any act, omission, or negligence of the Designer, sub-consultants and its and their agents or employees in the performance of the work covered by this Contract and/or their failure to comply with terms and conditions of this Contract. If the Designer is found negligent or in breach of contract, the duty to indemnify the City will include the duty to reimburse the City for its actual legal fees. The foregoing provisions shall not be deemed to be released, waived or modified in any respect by reason of any surety or insurance provided by the Designer under the Contract. The provisions of this paragraph shall survive the termination or expiration of this Contract.

ARTICLE 23: LEGAL REQUIREMENTS

1. Non-resident Processing: Signatures

   Every Designer who is a nonresident of the Commonwealth of Massachusetts, or a nonresident co-partner of a Designer hereby appoints the Secretary of the Commonwealth of Massachusetts and his successor in office to be his true and lawful attorney in and for Massachusetts, upon whom all lawful processes in any action or proceeding arising out of this contract may be served. When legal process against any such person is served upon the Secretary of State, a copy of such process shall forthwith be sent by registered mail with a return receipt requested by the Owner or its lawful Attorney to said Designer or nonresident co-partner at the

address set forth in the contract. Said Designer or said nonresident co-partner hereby stipulates and agrees that any lawful process against it which is served on said attorney shall be of the same legal force and validity as if served on said Designer or said co-partner. Such authority shall continue in force so long as any liability remains outstanding against said Designer or said co-partner.

2. Anti-Boycott Covenant

   The Designer warrants, represents and agrees that during the time this contract is in effect, neither it nor any affiliated company, as hereafter defined, will participate in or cooperate with an international boycott, as defined in Section 999 (b)(3) and (4) of the Internal Revenue Code of 1954, as amended, or engage in conduct declared to be unlawful by General Laws Chapter 151E, sections 2 and 3. If there shall be a breach in the warranty, representation and agreement contained in this paragraph, then without limiting such other rights as it may have the Owner shall be entitled to rescind this contract. As used herein, an affiliated company shall be any business entity of which at least 51% of the Ownership interests are directly or indirectly owned by the Designer or by a person or persons or business entity or entities directly or indirectly owning at 51% of the Ownership of the contract, or which directly or indirectly owns at least 51% of the Ownership interests of the Designer.

3. Access to Designer's Records - The City shall have the right, at reasonable times and upon reasonable notice, to examine the books, records, and other compilations of data of the Designer which pertain to the performance and requirements of this contract.

4. Truth-In-Negotiations Certificate

   If the Designer's fee is negotiated, the Designer will file a truth-in-negotiations certificate prior to being awarded the contract, which shall be incorporated into the contract. The certificate shall contain:

   (a) A statement that the wage rates and other costs used to support the Designer's compensation are accurate, complete, and current at the time of contracting; and

   (b) An agreement that the original contract price and any additions to the contract may be adjusted within one year of completion of the contract to exclude any significant amounts if the Owner determines that the fee was increased by such amounts due to inaccurate, incomplete or non-current wage rates or other costs.

ARTICLE 24: CHOICE OF LAW

This contract shall be construed under and governed by the laws of the Commonwealth of Massachusetts. The Designer, and the agents thereof, agree to bring any federal or state legal proceedings arising under this Contract, in which the Owner is a party, in a court of competent jurisdiction with the Commonwealth of Massachusetts. Venue for any legal actions initiated concerning this Contract or arising in any way from and out of

this Contract shall be brought in the appropriate state court sitting in Franklin County, having jurisdiction over said claim. The parties waive any right they may have to venue in any other jurisdiction.

ARTICLE 25: WAIVERS

The provisions of this contract can be waived only be written agreement, except where otherwise stated herein. Forbearance or indulgence by a party shall not be construed as a waiver, nor in any way limit the legal or equitable remedies available to that party. No waiver by either party of any default or breach shall constitute a waiver of any subsequent default or breach.

ARTICLE 26: AMENDMENTS

No amendments to this Contract shall be effective unless it is executed by the Designated Representative of both parties.

ARTICLE 27: SEVERABILITY

If any provision of this Contract is declared or found illegal, unenforceable, or void, then both parties shall be relieved of all obligations under that provision. The remainder of the Contract shall be enforced to the fullest extent permitted by law.

ARTICLE 28: DESIGNER'S CONTRACT SUPPLEMENTARY DATA

1. No changes are to be made in this Article at any time during the life of this contract without written notification to the City and when required, receipt of written approval by the City.

2. In accordance with the provisions of Massachusetts General Laws Chapter 7A, section 6, no contract to provide Designer services shall be awarded by the City, or by any department, board, commission, or other agency acting in its behalf, unless the person signing such contract on behalf of the party contracting to provide such services files with the City a statement under the penalties of perjury setting forth the names and addresses of all persons having a financial interest therein, not including, however, any person whose only financial interest therein consists of the holding of one percent or less of the capital stock of a corporation contracting to provide such services.

NOTE: Individuals who sign a contract in their own behalf must also complete the certification below as well as sign the contract. For the purpose of this directive, the term "person having a financial interest" will generally refer to any person who, in some direct manner, will benefit financially from a given contractual relationship with the City. However, this may not, in every case, preclude the possibility of an existing financial interest within the meaning of the statute where a financial benefit is to be realized in some indirect manner. Where doubts arise in a specific case, it is advisable that names and addresses be included.

By signing this Contract, the Designer certifies under the penalties of perjury that the following sets forth the names and addresses of all persons having a financial interest in this contract, in

accordance with the provisions of Chapter 7A, section 6.

Name Address

_____

3. By signing this Contract, the Designer certifies under the penalties of perjury that the following named (Principal) is registered by the Commonwealth as a _____ pursuant to the provisions of Massachusetts General Laws Chapter 112, sections 60A through 60O (architects), sections 81D through 81T (professional engineers and land surveyors), or sections 99 through 107 (registered landscape architects).

   Name **Title** **Mass. Registration No**.

NOTE: The above information must be completed to also comply with the provisions of Massachusetts General Laws Chapter 7C, section 44

4. By signing this contract, the Designer certifies under the penalties of perjury that the following named (Principal) is the designated officer of the firm contracted for the:

IF A CORPORATION: (Name Officers and Titles)

_____

_____

_____

IF A PARTNERSHIP: (Name of all Partners)

_____

_____

_____

IF AN INDIVIDUAL: (Name of Owner):

_____

MASSACHUSETTS REGISTERED PRINCIPAL OF FIRM RESPONSIBLE FOR THIS PROJECT IS:

5. By signing this contract, the Designer certifies under the penalties of perjury that 1) in accordance with Chapter 7C, section 51, the Designer has not given, offered or agreed to give any person, corporation, or other entity any gift, contribution or offer of employment as an inducement for, or in connection with, the award of the contract for design services; and 2) that no consultant to or subcontractor for the Designer has given, offered or agreed to give any gift, contribution or offer of employment to the Designer, or to any other person, corporation, or entity as an inducement for, or in connection with, the award to the consultant or subcontractor by the Designer; and 3) that no person, corporation or other entity, other than a bona fide full-time employee of the Designer has been retained or hired by the Designer to solicit for or in any way assist the Designer in obtaining the contract for services upon an agreement or understanding that such person, corporation or other entity be paid a fee or other consideration contingent upon the award of the contract to the Designer; and/or 4) the undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person, and that as used in this certification the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club or other organization, entity, or group of individuals. (Statutory reference: M.G.L. c.7C §51(d))
6. By signing this contract, the Designer certifies under the penalties of perjury that, as a corporation, the majority of the directors or a majority of the stock ownership and the chief executive officer at Johnson Roberts Associates, Inc., are persons who are registered architects, and the person to have the project in his or her charge is a registered architect.
7. By signing this contract, the Designer certifies under the penalties of perjury that it has internal accounting controls as required by subsection (c) of section thirty-nine R of chapter thirty and that the Designer filed and will continue to file an audited financial statement as required by subsection (d) of said section thirty-nine R of said Chapter 30. (Statutory reference: M.G.L. c.7, § 51(d)(iv))
8. By signing this contract, the Designer certifies under the penalties of perjury that the Designer and its consultants shall not be compensated for any services involved in preparing changes that are required for additional work that should have been anticipated by the Designer in the preparation of bid documents, as reasonably determined by the Awarding Authority. (Statutory reference: M.G.L. c.7, §38H(J))
9. By signing this contract, the Designer certifies under the penalties of perjury that pursuant to the General Laws of Chapter 62C section 49A, the Designer has filed all state tax returns, paid all taxes and complied with all laws of the Commonwealth relating to taxes reporting of contractors and employees and withholding and remitting of child support; and that pursuant to General Laws Chapter 151A, sec. 19A, the Designer has complied with all laws of the Commonwealth relating to contributions and payments in lieu of contributions to the Employment Security System.

10. By signing this contract, the Designer certifies under the penalties of perjury that, if the Designer is a corporation, the Corporation has filed with the State Secretary all certificates and annual reports required by Chapter 156B, section 109 (Business Corporation), by Chapter 181, section 4 (Foreign Corporation), or by Chapter 180, section 26A (Non-Profit Corporation) of the Massachusetts General Laws.
11. By signing this contract, the Designer certifies under the penalties of perjury that, the Designer is not currently debarred or suspended by the Commonwealth of Massachusetts, or any of its entities or subdivisions, under any Commonwealth law or regulation, including but not limited to M.G.L. c. 152, 25C.
12. By signing this contract, the Designer certifies under the penalties of perjury that, the Designer is aware of the American with Disabilities Act which prohibits discrimination based upon disability and shall meet the standards applicable under the American with Disabilities Act 42 U.S.C. 12101 et seq.; 28 C.F.R. Part 35, as amended.

SIGNATURES

IN WITNESS WHEREOF, on the day and year hereinabove first written the Designer (if individual) has hereunto set his hand and seal – (if partnership) has caused these presents to be signed and sealed by its partner in the name of the partnership – (if Corporation) has caused these presents to be signed and sealed in its name and behalf, and its corporate seal to be hereto affixed by the signatory below authorized so to do* -- and in each case the signatory makes the representations and certifications set forth in Article 26 under the pains and penalties of perjury, and the Owner has signed these presents in behalf of the Commonwealth.

EXECUTED IN TRIPLICATE

*If a Corporation, attach to each signed copy of this contract an attested copy of the vote of the Corporation authorizing the said signing and sealing.

IN WITNESS WHEREOF, the parties to these presents have executed this contract in the year and day first above mentioned

Approved as to form: By: DESIGNER

_____ _____

Gordon D. Quinn, City Attorney Authorized Signature Date

_____

Print Name and Title

By: CITY OF GREENFIELD

_____

Roxann Wedegartner, Mayor

I hereby certify that the City of Greenfield has an appropriation to cover the cost of this contract in accordance with Ch 44 §31C of the Massachusetts General Laws.

_____
Liz Gilman, Finance Director

Certification Form combined with Corporate Signatory Authorization

At a duly authorized meeting of the Board of Directors held on _____at which all the Directors were present or waived notice, it was voted that_____ _____ of this company, be and he/she hereby is authorized to execute contracts and bonds in the name and behalf of said company, and affix its Corporate Seal thereto, and such execution of any contract or obligation in this company's name on its behalf by_____, shall be binding upon this company.

A TRUE COPY ATTEST*:*

_____
(Clerk of the Corporation) (Print Name & Signature)

Place of Business: _____
_____

I hereby certify that I am the clerk of the _____ and that
(Print Name of Corporation)
_____ is duly elected _____ of said
(Print Name of Officer) (Print Signatory Name & Title)
Company, and the above vote has not been amended or rescinded and remains in full force and effect as of the date of this contract.

_____
(Clerk of the Corporation)

(CORPORATE SEAL)

IF A FOREIGN CORPORATION: I hereby certify that I comply with the provisions of Massachusetts General Laws, Chapter 30, Section 39L and Chapter 156D as they relate to Foreign Corporations.
(check one) □ Not Applicable □ I comply and am registered and in good stating with the Massachusetts Secretary of State.

NOTARIZATION:

On this _____ day of _____, 2020, before me, the undersigned notary public, personally appeared _____, proved to me through satisfactory evidence of identification, which were _____, to be the person whose name is signed on the preceding or attached document in my presence.

_____
Notary Public
My commission expires: _____

ATTACHMENT A

Designer Fee Schedule Breakdown

ATTACHMENT B

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club or other organization, entity or group of individuals.

_____
(Name of person signing bid or proposal)

_____
(Name of business)

ATTACHMENT C

CERTIFICATE OF COMPLIANCE WITH TAX LAWS

Pursuant to M.G.L. c. 62C, § 49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

_____ By:_____
Signature of person submitting bid or proposal* Signature of Corporate Officer
(mandatory, if applicable)

_____
Social Security Number or Tax I.D. **

* Approval of a contract or other agreement will not be granted unless this certification clause is signed by the applicant.
**This number will be furnished to the Massachusetts Department of Revenue to determine whether you have met tax payment obligations.

ATTACHMENT D

SCOPE OF DESIGNER'S SERVICES

The following sets forth the scope of Services to be performed by the Designer. The Designer's Services shall be performed in the Phases as follows:

Phase I: Final Schematic Design

A. Site Planning and Development

A. Site planning and development shall consider all pertinent data and the parking, roadway, playground etc. requirements developed in the programming phase.

B. Prepare a list of any needed site improvements that may not be identified and provide a detailed cost estimate.

B. Design Development

A. Develop schematic floor plans, elevations, and perspective drawings. Prepare schematic building design plans including floor layout plans and elevations.

B. Develop site criteria consistent with local zoning ordinances, with special attention to building footprint area(s), parking and vehicular circulation in order to determine the minimum buildable site area required.

C. Create a master file of all pertinent state and local zoning by-laws, building codes and building safety requirements and submit such file or copies thereof to the City.

D. The Designer shall submit a detailed schedule indicating/confirming Project milestones.

E. Update the program upon completion of a detailed square footage list.

F. Meet with regulatory agencies as required including (State, Federal & Local Officials) regarding any concerns and prepare applications for permits and approvals.

G. At the end of the Schematic Design Phase the Designer will prepare and submit to the Owner a revised construction cost estimate.

C. Other Work:

A. Prepare a detailed statement of all probable costs for the creation of the design documents (including costs of plans and specifications) and estimated costs for development and construction of the Greenfield Library Project, including estimated costs for Project oversight, Project administration, as well as producing documents as required by the bidding procedure.

This information will be used to seek funding for the design & construction phase.

B. Assist the library administration in determining estimated comparative operating costs associated with the various conceptual building designs.

C. Attend all meetings (including evening meetings) as necessary to assist in disseminating information and providing explanations. Provide all drawings, paperwork and Power Point presentations required.

Phase II: Design Development

1. Sitework

   A. Update site plan to include firm placement of buildings on site and their relationship to each other (adjacent, connected to each other). Identify appropriate spot elevations at buildings. Firm up proposed contours. Show all site utilities and drainage structures. Indicate contract limit lines.

   B. Clarify parking capacities (staff, parents, volunteers, etc.) and vehicular circulation. Also indicate service access sidewalks and interconnecting walking paths.

   C. Develop a landscape plan that indicates major elements such as berms, screens, planting groups, foundation plantings, walkway materials, bollards, fencing, lighting strategies and retaining structures.

2. Building Design

   A. Show updated floor plans with all programmed spaces, key dimensions and proposed finish schedules. Provide room names or numbering system with legend (show square footage by area).

   B. Provide updated elevations, indicating materials, window types, canopies, etc.

   C. Develop building sections as required to adequately explain internal volumes, circulation, major spaces, etc. Also develop wall sections to indicate and understand floor to floor relationships, plenum spaces, materials, structural assemblies and wall penetrations. Include dimensioning.

   D. Provide mechanical design drawings indicating proposed system design, equipment type and placement, main duct runs and mechanical rooms. Show boiler room area with proposed boilers, pumps, compressors. Determine with the Owner all areas to be considered for air conditioning.

      1) Heating, Ventilating and Air Conditioning Drawings

         A. The heating and cooling systems indicating in sufficient detail the source of heat and cooling and method and location of heating and cooling distribution and controls within the building.
         B. Show locations and approximate sizes of piping systems.
         C. Provide electrical design drawings indicating proposed design. Indicate main electrical room, sub-panel and transformer placement. Show typical classroom distribution. Coordinate with FF&E so as to accommodate

computer placement, TV's and video equipment. Indicate head end room and cable junction points.

2) Electrical Drawings

A. All service connections and electrical equipment (panels, transformers and switch gear) shall be located on the drawings.

B. Lighting shall be indicated as to type, location and intensities in foot-candles for each space, room, or typical space.

C. All services for special purposes shall be located and indicated.

D. Coordinate all emergency power circuits and emergency generators with the Owner.

E. Show normal and emergency lighting distribution on reflected ceiling plan.

F. Provide plumbing and fire protection design drawings indicating main and distribution piping, elementary classroom sinks, lavatory layout and placement. Indicate service to related equipment.

3) Fire Protection Drawings

A. Floor plans indicating wet or dry type systems hose racks or cabinets and fire department tie-ins. For tile ceilings, sprinkler heads shall be located on centerline of tiles.

B. Fire protection Systems over $10,000 shall be included as a filed sub-bid.

4) Plumbing Drawings

A. Floor plans indicating locations of all plumbing fixtures and special features, and approximate size of all piping systems, principal items of equipment and typical riser diagrams.

E. Provide structural design drawings that indicate major structural components, manner of connection, bracing and deck work. Determine foundation design and intended materials.

1) Structural Drawings

A. Locations and dates of test boring holes and results of soil investigation including water levels, allowable soil bearing pressure and bottom grades of footings and slabs.

B. Alternate structural designs with comparative cost estimates as required.

C. Structural drawings indicating type and character of structural systems, including sized of typical members.

F. Provide outline specifications. Identify Filed Sub-Bids and proprietary items.

1) Specification Requirements

A. Outline specifications that are to accompany Design Development Drawings shall consist of a comprehensive description of the project and the materials proposed for use in the work. No detailed specification of materials or workmanship procedure need be included; however, the general scope shall be indicated by Sections as required for Construction Specifications. The Design Development Outline Specification shall also include a comprehensive "BASIS OF DESIGN" for establishing control and coordinating the various criteria to satisfy the needs of the program. The "BASIS OF DESIGN" shall be an narrative description of the project and shall include all applicable architectural, civil, structural, mechanical and electrical programs and/or system.

B. The following is a list of items which shall be considered in this phase of design:

1) Site Work; clearing, drives, walks, parking areas, fences, excavation, backfill, planting.

2) Footings; on earth, rock, piles, caisson, proposed bearing pressures, boring logs, reasons for adopting system proposed.

3) Foundation walls; type of concrete, reinforced, type and extent of waterproofing.

4) Footing drains; type, disposal of drainage.

5) Exterior Walls; superstructure, type, materials, brick type and coursing, alternate cladding, back-up materials, damp proofing material and extent, special features.

6) Roofs; types, vapor barrier, insulation, flashing, materials.

7) Flashing; general types, materials, weights, where each type is to be used.

8) Sheet metal; gutters, leaders, other uses, except flashing.

9) Window; general types, materials, section weights, sub-frames finish, glazing, screens.

10) Doors, exterior and interior; types and thicknesses.

11) Steps, exterior; including platforms, landings, wall; materials and finishes.

12) Partitions; materials, thicknesses, and finishes.

13) Framing; wood or metal systems in according with general design requirements.

14) Partitions; materials, thicknesses, and finishes.

15) Cabinet and casework; types and materials.

16) Food Service Equipment; types and materials

17) Furring; lathing, plastering, materials and location.

18) Insulation thermal; types, thicknesses, methods of application and location.

19) Acoustical treatment; types, thicknesses, methods of application and location.

20) Interior finishes; materials for floors, walls, bases, wainscots, trim, ceilings, ceiling heights.

21) Fire Protection; standpipe systems, sprinkler systems, fire pumps and accessories.

22) Water supply, source, location of main to which connection will be made, type of pipe for service main, load requirements, load factors and pressures.

23) Sanitary sewer; sewage disposal system, pipe and other materials.

24) Storm sewers; flowage disposal system, pipe and other materials.

25) Gas main; material, size and location.

26) Plumbing; systems such as wastes, vents, hot water, cold water, gas, air, oxygen, vacuum, main source of supply, materials for each, water heaters, pumps, thermal insulation, fixtures quality, all special features.

27) Heating, ventilating and air conditioning; type of heating and refrigeration plants, types and capacity of boilers and cooling equipment, fuel, grade and oil, type of burners, fuel storage, beaters, feed water pumps and heaters, thermal insulation, type of heating medium, supply and return piping, radiation, unit heaters, radiant heating, air conditioning, special features.

28) Electric work; service connection, location, institution or public utility, overhead or underground, transformers including type and location, types of conduit and wiring, types of fixtures, location of main switchboard, specials such as doctors and nurses call systems, radio, fire alarm, telephone, public address, emergency lighting and wiring, emergency or other generators, special features, including Master TV information retrieval and/or data processing system.

29) Elevators, escalators, dumbwaiters, and platform lifts; capacities, speed, travel in feet, landings, operation, controls, platform sizes, machine type and location, car and entrance finishes, signals.

30) Other built-in equipment, types and materials

31) Estimating Requirements

a) During the Design Development phase, cost estimates shall be developed in as much detail as the drawings and specifications permit.

b) Cost estimates in the Design Development Document phase shall be prepared by competent estimators as required by the Designers Contract. The estimator is subject to the City's Approval.

a) A total cost for each Section of the Specification shall be included.

b) The estimate shall reflect the current construction cost. The total cost shall include a contingency factor, as determined by the Designer. The anticipated bid date will be verified by the City of Bedford with the Designer's input. The Designer shall include all inflation/escalation factors.

c) Summary sheet shall be developed which shall contain each section of the work as well as the following:

1) The date that the estimate was prepared. (Value Date)

2) The anticipated bid date.

3) The project and contract number

4) The title and location of project

5) The name of the Designer

6) The name of the Estimator

7) The site cost (including all utilities)

8) The building cost (including fixed equipment

9) The estimated construction cost of each section of the work totaled.

10) The gross square footage of building.

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11) The net square foot cost of building.

12) Indicate ratio of net to gross square footage.

13) Unit user cost (student, bed, inmate, etc.)

14) Estimated number of calendar days required for construction of the project.

Phase III: Construction Documents and Bidding

1. Site Plans

   A. Coordinate with City planning, Zoning and Conservation Commission regarding local requirements.

   B. Site drawings showing contract limits, existing and proposed contours, water flow indicators, all significant topographical features, proposed utilities and connections to existing counterparts.

Site Drawings shall indicate the following:

2. Layout and location of all proposed work including buildings, structures, retaining walls and other site improvements with details.

   A. Existing and proposed grades and contours including floor elevations, existing structures and topography, survey base line, bench marks, and boring locations.

   B. Landscaping and planting including contract limit line and storage area for construction materials.

   C. All utility service lines, systems and structures for electricity, gas, oil, water, steam, telephone, sanitary and storm drainage including size, composition, grades and

directions of flow. (Note to the Designer: Use a separate site drawing to show utilities on projects with excessive layouts and details).

D. The Designer shall certify, in writing, to the City that applicable local and state officials have been contacted regarding each utility connection and that the department responsible for permits or connection approval has agreed to the system's use.

E. On projects where walks are elevated by curbing, provide curb cuts with ramps to meet the physically handicapped requirements.

F. Indicate location of transformers and generators and connections to offsite power source. Show all underground service from buildings to sweeps at off-site pole. Show all site lighting. Include cabling and access. Indicate proposed pole and fixture types.

G. Proposed building placements, limits and spot elevations, show appropriate dimensioning.

H. Pedestrian and vehicle circulation and all proposed landscaping elements.

I. Indicate site amenities such as benches, site lighting and signage.

J. Provide large-scale drawings to show intent as to configuration and installation of site elements. Provide details for storm and sewer system elements, paving and curb requirements.

3. Building Plans

A. Foundation drawings indicating proposed configuration and construction of spread footings, frost walls, slabs, etc. and all other information as required. Include soil bearing requirements and reference borings schedule. Indicate penetrations, steps, interior footings and reinforcement.

B. Provide detail and/or section drawings as required. Dimension all drawings and indicate all appropriate elevation references.

C. Identify slab type, thickness and required finish. Show expansion and construction joints. Detail connections to foundation wall. Dimension as required. Provide necessary information regarding soil condition/requirements under slab.

D. Provide reinforcement schedule. Detail as required.

E. Identify framing members by size and type. Show location. Include lateral bracing. Include metal decking selection for floor decks and roofs.

F. Detail connections to other members, to decking and to concrete footings/foundation. Show lap and bearing minimums.

G. Provide demolition plans identifying extent of demolition.

H. Architectural drawings to include plans for all floors and roof areas. Fully dimension all drawings. Insure section, note and detail references are coordinated with other sheets. Provide locus reference, scale and revision dates.

I. Show all roof drains, expansion joints, indicate drainage flows and show all penetrations and all projections, including equipment. All roof details should be discussed with specified manufacturers to ensure compliance with standard manufacturer standards.

J. Clearly identify room names and numbers using a system approved by the Facilities Department.

K. Take sections through the plans as necessary to explain intended design factors and technical assembly.

L. Show all elevations in sufficient detail and scale to communicate intent. Ensure section, note and detail references are coordinated. Call out all appropriate elevation references (top of foundation, floors, floor to floor distances, top of wall, etc.). Coordinate with other drawings.

M. Provide detail sheets and building section drawings sufficiently informative so as to provide information necessary to construct the project. Closely review standard details for consistency with this project.

N. Provide large scale drawings (plans, elevations, etc.) to explain intent as to interior features such as casework, stair construction, interior lights, tile patterns, wainscoting and recessed items. Key accurately to plans.

O. Provide reflected ceiling plan to indicate soffits, access panels and ceiling tile configuration.

P. Keying/Locking plan acceptable to the Facilities Department.

Q. Provide phasing plans to identify construction phasing.

R) Legend of materials, abbreviations and symbols.

S) Wall sections indicating dimensions, flashing, anchorage, reinforcing, coursing, cladding, and other details showing all conditions.

T) Exterior and interior elevations and cross-sections including floors to ceiling heights. Designate all items of materials.

U) Details for roofing, flashing, insulation, windows, doors, entrances, interior and exterior walls, expansion, control or construction joints, water stops, stairs, handrails, millwork and built-in equipment.

V) Locations of all mechanical and electrical penetrations through walls and floors.

4. Structural Drawings

A) Boring plans with dates, ground elevation water level, and bottom grades of footings and slabs plotted.

B) Foundation plan with bottom grades showing layout of all footings, walls, slabs on grade including reinforcing, grade beams, and columns; include design soil bearing pressure and live loads for each area.

C) Floor and roof plans of structural systems including framing, grades of finished floors and depressed areas, with locations and dimensions for all openings. Also indicate design floor loads.

D) Complete foundation wall elevation and typical sections, with reinforcing indicating location, dimension and grades for all footings, steps and wall openings.

E) Complete details and section and dimensions for all construction including expansion and construction joints reinforcing and other embedded items.

F) Schedule (with dimensions) for all lintels, beams, joists and columns.

G) Unless detailed on the drawings, the following information shall appear in the general notes, Sheet S-1: class and 28 day strength of concrete's for each portion, structural steel and concrete reinforcing design stresses for each type of structural member, concrete cover for each type of structural member, shrinkage and temperature steel requirements, reinforcing laps for main reinforcing and temperature steel, bend point, cutoff, and hook locations for all members, minimum beam and lintel bearing. Reinforcing steel

fabrication shall be in accordance with most recent ACI, "Manual or Standard Practice for Detailing Reinforced Concrete." Structural steel fabrication shall be in accordance with the AISC "Manual of Steel Construction."

H) Roof structural systems shall be designed for a minimum of ¼ inch per foot pitch to roof drains.

5. Fire Protection Drawings:

A. Fire protection drawings shall indicate standpipe systems, sprinkler systems, access panels, fire pumps and accessories.

B. Fire Protection work, other than site work, shall not be combined on the same sheets with the Plumbing, HVAC, Electrical, or other drawings except with the prior approval of the City's Facilities Department.

6. Mechanical Drawings

A. Where applicable, provide demolition drawings identifying extent of demolition.

B. Where applicable, indicate all proposed equipment, in place and complete. Show connected supply, return and vent piping distribution system. Indicate flow diagram. Show all supply and exhaust ductwork. Call out insulated portions of system. Identify unit ventilators, baseboard heat and cabinet heaters. Provide a DDC controls system.

C. Provide schedule and symbol legend for all abbreviations shown on drawings.

7. Plumbing Drawings

A. Where applicable, provide demolition drawings indicating extent of demolition.

B. Show all piping. Include riser diagrams and necessary venting. All piping shall be carefully sized and all sizes shall be indicated on drawings and riser diagrams. All directions of flow and pitch of piping.

C. Where applicable, show all piping for the sanitary system. Show all accessories necessary for installation and proper operation to and including all building fixtures and connections to site sewer piping. Coordinate with site drawings.

D. Show all system requirements necessary for gas or air systems.

E. Coordinate with City Department of Public Works regarding local requirements, back-flow prevention and connection tie-ins.

F. Diagram all necessary components for a complete fire protection system including main and secondary piping. See Fire Protection

G. Show head location diagram. Indicate connection and equipment located in Sprinkler head-in room. See Fire Protection

H. Provide a schedule and symbol legend for all abbreviations on drawings.

I. Plumbing work, other than site work, shall not be combined on the same sheets with the Fire Protection, HVAC, Electrical, or other drawings except with the prior approval of the City.

J. Trapping and venting of all plumbing fixtures including floor drains.

K. Clean-outs in accordance with the Mass. State Plumbing Code.

8. Electrical Drawings

A. Building Service: Indicate main panel and main breaker location. Coordinate with site drawings. Show location of meter.

B. Show control, telephone, public address, and cable and sound wiring. Indicate locations of all receptacles. Identify devices and their location.

C. Indicate all necessary support equipment and methods. Show cable trays, backboards, conduit supports, drops and wall penetrations to head end room and service points.

D. Indicate type and location of all fixtures and switches. Indicate circuit wiring to fixtures. Indicate suspension requirements.

E. Electrical drawings shall indicate the following:

1) Electrical work, other than site work, shall not be combined on the same sheets with Fire Protection, Plumbing, HVAC, or other drawings except with the prior approval of the City.

2) Interior lighting system; type of wiring, light fixture schedules, location and mounting heights of all fixtures, receptacle and switch outlets, sizes and types of all lamps, conduits, all other accessories and riser diagrams shall be indicated on the drawings. Indicate details and method of supporting electrical fixtures and conduits. Designer shall specify that all electrical lighting fixtures be supported from the building

structure, and shall be independent of ducts, pipes, ceilings and their supporting members.

3) Power System; locations, types, and methods of control for all motors, heaters, appliance, controllers, starters, branch circuits, feeder conductors and conduits. Indicate riser diagrams.

4) Exterior lighting; location, size, and types of transformers, luminaries, poles, light standards, cables, ducts, and manholes, details or control equipment and connecting diagram.

5) One line diagram indicating load in KVA, and available short circuit amperes at each transformer, switchboard, distribution panel board, branch circuit panelboard, and at major pieces of equipment.

F. Indicate all fixtures connected to emergency lighting scheme.

G. Provide demolition drawings indicating extent of demolition.

9. Heating, Ventilation and Air Conditioning

Heating, Ventilation and Air Conditioning Drawings shall indicate the following:

A. HVAC work, other than site work, shall not be combined on the same sheets with Fire Protection, Plumbing, Electrical or other drawings except with prior approval of the Owner.

B. All piping and ductwork systems shall be located, sized and designed acoustically per the user's needs.

C. All systems shall be sized at all reductions and riser diagrams of piping and duct systems shall be indicated.

D. All ductwork shall be shown double line unless otherwise approved in writing by the Owner.

10. Bidding and Award

A. Open bid packages at the appointed time and review them for proper format and inclusion (DCAMM certification, update sheet, bid bond, acknowledged addenda, etc.). Compile bids in a spreadsheet format. Provide recommendation to Owner.

B. Prepare all addenda during the bid period.

1) All questions by the prospective bidders as to the interpretation of the Notice to Contractors, forms of proposal, forms of contract, drawings, specifications or form of performance bond and labor and materials bond shall be submitted in writing to the Owner with a copy to the Designer.

2) The Designer shall immediately draft a response to the Owner relative to all questions and shall include his recommendation for possible inclusion in an addendum.

3) The Designer shall compute, establish and itemize the added cost or deduction to the estimated contract price for all items to be included in the addendum.

4) The necessity and cost of the proposed addendum shall be written in a separate letter provided that the Owner has been verbally informed as to the necessity and cost.

5) The addendum shall be clearly typed on good quality unfolded bond paper and delivered to the Owner at least seven working days prior to the receipt of sub-bids or if no sub-bids are involved, seven working days prior to the receipt of general bids. The Designer shall forward the addendum to sub-bidders and general bidders.

6) Addendum pages, including any drawings, shall be numbered consecutively with total attachments indicated on each page, i.e. page 1 of 8, page 2 of 8.

C. Attend sub-bid openings

D. Review and evaluate sub bids

E. Attend General Contractors' bid opening

F. Review and evaluate general bids

G. Review qualifications of the lowest responsible, eligible general bidder.

Phase IV: Construction Administration

Upon receipt of bids and upon recommendation of project award by the designer and OPM, the City may elect to extend designer services to include Construction Phase Oversight and Closeout services. Upon written direction from the City, the Designer shall proceed with Construction Phase services, included but not limited to the following:

1. Pre-Construction Conference:

Upon acceptance of bids, assist Owner in preparation of the construction contract and hold a pre-construction conference with general and all available sub-bidders. The agenda will be the General and Special Conditions, scheduling and administrative requirements (e.g. weekly submission of prevailing wage sheets, schedule and as-built updates prior to requisition approvals, pencil requisition consideration, substitutions, etc.) of the project. The Designer shall take minutes of the pre-construction meeting and distribute to attendees.

2. Construction Period:

   As the project commences, the Designer will visit the site as required, but not less than once a week, to become familiar with and ensure that the Work is proceeding according to the contract documents. Additionally, the Designer will attend weekly project meetings, taking notes as required to provide weekly meeting minutes to be completed and distributed to all parties prior to the next meeting.

3. Progress Schedule:

   The Designer shall include in the General Conditions a Contractor requirement to develop, submit and regularly update a progress schedule in a format acceptable to the Owner. The Designer will review this schedule to ascertain its completeness and feasibility within the project timelines.

4. Shop Drawings:

   The Designer shall be responsible for tracking, reviewing and approving all shop drawings required by the project. A control document identifying the status of all required submissions shall be kept and attached to the meeting minutes.

5. Requisitions for Payment:

   The Designer will include in the General Conditions, a requirement that the Contractor will submit a Schedule of Values and a Payment Schedule apportioned across the length of the project and consistent with the Construction Progress Schedule. The Schedule of Values shall include a separate line for General Conditions as for all other aspects of the Work.

   The Designer will review a "pencil requisition" with all parties at the appropriate project meeting. If it is acceptable as is or is amended reflecting only work completed in the previous pay period, and not anticipated to be done by the end of the month, the final requisition shall be submitted.

6. Change Orders:

   The Designer shall develop change proposals, if any, as generated by his/her office

or the Owner as well as reviewing and making recommendations regarding contractor-requested change proposals. Such proposals shall be reviewed by the Designer and a written summary recommendation submitted to the Owner.

The Designer shall develop the change order document for approval and signature by all parties. A change order log shall be developed that tracks all requests and their status. This log shall also be attached to the meeting minutes and reviewed weekly.

In summary the Designer shall act as an agent of the Owner and administrate the project throughout the entire construction phase, as follows:

(a) Attend pre-construction meetings

(b) Take minutes of all meetings

(c) Conduct weekly project meetings with consultants in attendance if required

(d) Recommend approval of schedule of values

(e) Approve progress schedule

(f) Review and approve shop drawings and samples

(g) Conduct timely work progress inspections with consultants

(h) Review Record drawings monthly

(i) Evaluate and recommend General Contractor's monthly payments

(j) Participate in the approval of payment for stored material.

(k) Prepare request for proposals for change orders

(l) Participate in change order process

(m) Recommend on extensions of time

(n) Contract for and monitor applicable construction testing

(o) Arrange for periodic project progress photographs

(p) Monitor General Contractor's performance

(q) Provide all clarification to Contract Documents.

7. Project Close-Out:

   As operating and maintenance manuals are submitted, they are to be reviewed and approved by the Designer. The Designer shall review all as-built documents for completeness and accuracy.

   The Designer shall certify that the Contractor has achieved Substantial Completion when the Work has thus proceeded *and* a provisional Certificate of Occupancy has been obtained. The Designer shall develop a comprehensive punch list that, once completed, will satisfy the requirement to complete.

8. Contract Close Out Procedures:

   a) The Designer shall submit a checklist of all closeout documents to the Facilities Department prior to the delivery of close out documents.
   b) Upon notification by the General Contractor that less than one percent of the work remains to be completed, conduct a semi-final inspection.
   c) Establish a final punch list and monetize it.
   d) Recommend mount of semi-final payment to the General Contractor
   e) Obtain all operations and maintenance manuals
   f) Confirm that all operations and maintenance instructions have been given to the Owner
   g) Obtain all guarantees and warranties beyond the normal one year guarantee
   h) Confirm that spare parts, maintenance materials and replacement products have been delivered to the Owner
   i) Ensure that appropriate documentation is submitted and proper inspections have taken place to secure an Occupancy permit.
   j) Sign final acceptance papers. Sign an affidavit of compliance that certifies that the construction has been inspected and that it complies with contract documents and all the regulations of the Massachusetts Building Code
   k) Evaluate General Contractor's performance

SCHEDULE I
Schedule of Performance

Phase	Completion Date
PHASE I Final Schematic Design:	
Design to proceed with chosen option	_____
Final Schematic Design Proposal	_____
PHASE II Design Development:	
Final Schematic Design Development	_____
PHASE III Construction Documents & Bidding:	
Contract Completion: Contractors/Designers	_____
PHASE IV Construction Administration	
Sign final acceptance papers	_____

SCHEDULE II
COMPENSATION TO DESIGNER

Phase	Approx. %	Amount
Phase I: Final Schematic Design	___%	$_____
Phase II: Design Development	___%	$_____
Phase III: Contract Completion: Contractors/Designers	___%	$_____
Phase IV: Construction Administration	___%	$_____